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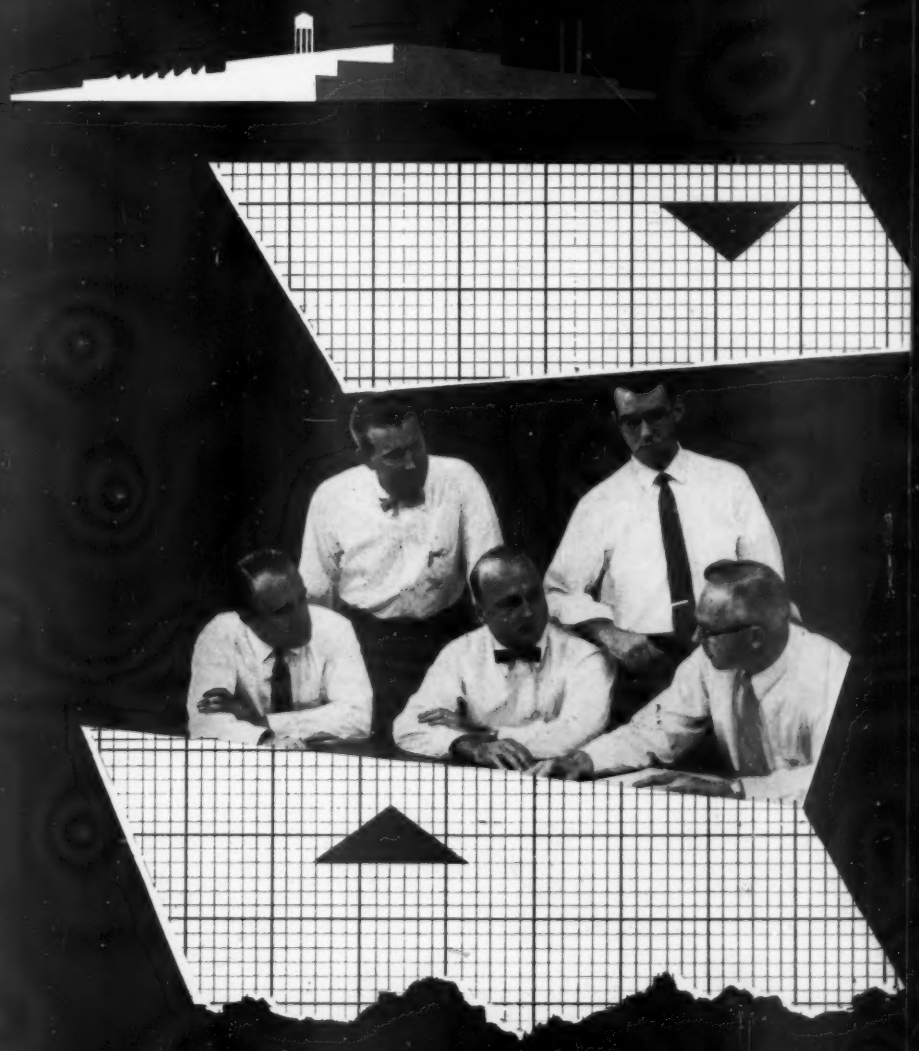
assembly & fastener ENGINEERING



OCTOBER • 1958

In this issue: **Sound Design Checks Vibration**

The Challenge of Product Reliability

Flip . . . file . . . find

This man is solving a fastener problem

the Pheoll *way!*

The experience on file in the Pheoll field man's brief case —and mind—very often yields *on-the-spot* answers to tough fastener problems. Other solutions may require the particular skills and training of other—or *all*—members of the Pheoll "specials" team. But in every case, you're sure of efforts by men who work under one slogan . . . *TRY!* This willingness to *try* at Pheoll generally pays off—in the *right* answer, at the *right price* for you! Why not try *your* fastener problem on the Pheoll field man . . . the next time he calls!

Incidentally, the man in the photograph *is* a Pheoll field man . . . George Cahill, a 23-year veteran in the fastenings industry *—with Pheoll!*

Pheoll Manufacturing Company
Industrial Fastener Division
5700 WEST ROOSEVELT ROAD
CHICAGO 50, ILLINOIS

assembly & fastener ENGINEERING

October, 1958 Volume 1, Number 1

FEATURES

DEPARTMENTS

• Bill Schleicher, editorial director, outlines "Assembly and Fastener Engineering" policy to his team: Standing l. to r., Darrell Ward, field editor, Ray Smith, assistant editor; seated, Vic Erickson, art consultant, Matt Heuertz, managing editor.

Subscription rates: $6.00 per year in U.S.A. $7.50 per year elsewhere.

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WATCH AMERICAN

for New Ideas Coming Soon in

... Product development
... Profit improvement
... Quality control

The biggest news in fasteners comes from ... American!

AMERICAN SCREW CO. • WILLIMANTIC, CONN.
CHICAGO, ILL. • DETROIT, MICH.

Use postpaid card. Circle No. 201

Another Tinnerman Original...

Self-retaining "U" and "J" SPEED NUTS® cut assembly costs up to 50% or more!

If you are worried about rising assembly costs, let one-piece "U" and "J" SPEED NUTS keep costs down... and improve your product.

They can't fall off, once they've been pressed into screw-receiving position. No welding, staking or other secondary fastening devices needed. You eliminate lock washers – spring steel SPEED NUTS are self-locking, make vibration-proof attachments.

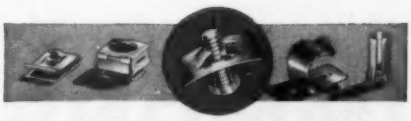
SPEED NUTS are ideal for blind assembly or hard-to-reach locations. Apply them *before* you paint panels without danger of paint-clogging. Or *after* porcelainizing, without damage to finishes. The "U" type is similar to the "J" type, shown above, but is used where full bearing surface on the lower leg is required.

A free Fastening Analysis can tell where SPEED NUT brand fasteners belong on your products. Call your Tinnerman representative – he's listed in most major telephone directories. Or write to:

TINNERMAN PRODUCTS, INC.
Dept. 12 • P. O. Box 6688 • Cleveland 1, Ohio

TINNERMAN

Speed Nuts®



FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales. FRANCE: Simmonds S. A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano-Bundy GmbH, Heidelberg.

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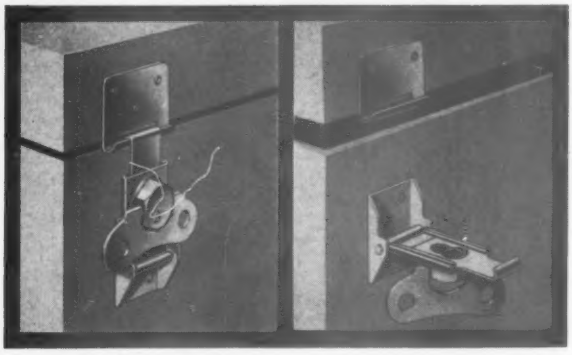
Zero cases, sealed pressure-tight by **LINK-LOCK**,

Simmons No. 3 LINK-LOCK fasteners are employed on these deep-drawn aluminum Zero transit cases. LINK-LOCK is available in three sizes, for light, medium, and heavy duty.



No. 2 LINK-LOCK. Half turn applies high closing pressure, counter-turn disengages for opening.

guard instruments against humidity, dust, atmospheric pressure changes

Delicate electronic and optical equipment is shipped long distances . . . handled again and again . . . and sometimes stored for long periods in transit cases manufactured by the Zero Manufacturing Company, Burbank, California.

The unique containers shown here are deep-drawn aluminum, seamless, with precision-fitting gasketed lids. They comply with rigid military specifications, insuring protection of contents against humidity, dust, and variations in pressure.

To effect the critically important pressure-tight seal, Zero specifies Simmons LINK-LOCK fasteners.

Here's why LINK-LOCK is ideal for use on precision-built military cases as well as on inexpensive commercial containers:

- Positive-locking without springs.
- Impact and drop resistant; not affected by arctic temperatures.
- Compact design—lies flat open or secured.
- Latch design can be varied to suit different applications.
- High preloading and high load-carrying capacity.

WRITE FOR CATALOG NO. 1257
It contains specifications, drawings, details of LINK-LOCK and other Simmons Fasteners with unlimited money-saving applications.

SIMMONS FASTENER CORPORATION

1796 North Broadway, Albany 1, New York

QUICK-LOCK • SPRING-LOCK • ROTO-LOCK • LINK-LOCK • DUAL-LOCK • HINGE-LOCK

See our 8 page catalog in Sweet's Product Design File
Use postpaid card. Circle No. 203

THE EDITOR'S VIEW

OCTOBER, 1958 VOL. 1, NO. 1

AN OPPORTUNITY TO SOAR YOUR IMAGINATION

JUST think: 50 to 75 per cent of industry's manufacturing cost is spent in the assembling and fastening of America's products. What an area for you to rummage around in with bold schemes and inspiration. Not since the first mechanical materials handling truck rumbled onto the scene years ago has the engineering fraternity had such an opportunity to soar their imaginations and exercise their creative gifts as in this area of assembling and fastening.

And that's the reason for ASSEMBLY & FASTENER ENGINEERING: to help point the way.

Too many people in high quarters, government as well as industry, have sniffed at the screw, the soldering torch, the welding rod and the assembling machine as dime store or hobby store items. Necessary evils to be purchased at the nearest corner store at the cheapest possible price.

But fasteners are not corner store items. We firmly believe the fastener and the method of assembling products is more important than many phases of engineering and production.

This price situation! This ghastly cut-throat dealing with pennies at the point of purchase at the expense of huge savings at the point of assembly. What gains a company to save five dollars per thousand at the purchase point only to throw away 25 dollars on the assembly line?

And reliability! Things falling apart. Service bills, Irate customers. Missiles failing. Billions down the drain because too many times the fasteners used are suited only for the old oaken bucket days and not for this missiles age. Reliability: the guarantee that a product performs and holds together as it was planned to, using new ideas, new conceptions, new products.

ASSEMBLY & FASTENER ENGINEERING will bring you news of this.

So important an item as a fastener and the method of assembling is not to be delegated to the lowest man on the totem pole after the design has been frozen. As an architect does not design a house without knowing (while he designs it) how it will be held together, why do we in industry, who know better, design wondrous things and then turn our backs on how, and with what, it is to be assembled..

Assisting you in the planning for fastening and assembling at the design stage is one of our goals.

And so a magazine is born. Not a nut and bolt and screw magazine, but a magazine of methods, of ideas, a meeting place of new conceptions and a clearing house of advanced thinking. A magazine to help you and, now and again, to entertain you, and even to prod you, but at all times to have your problems at heart.

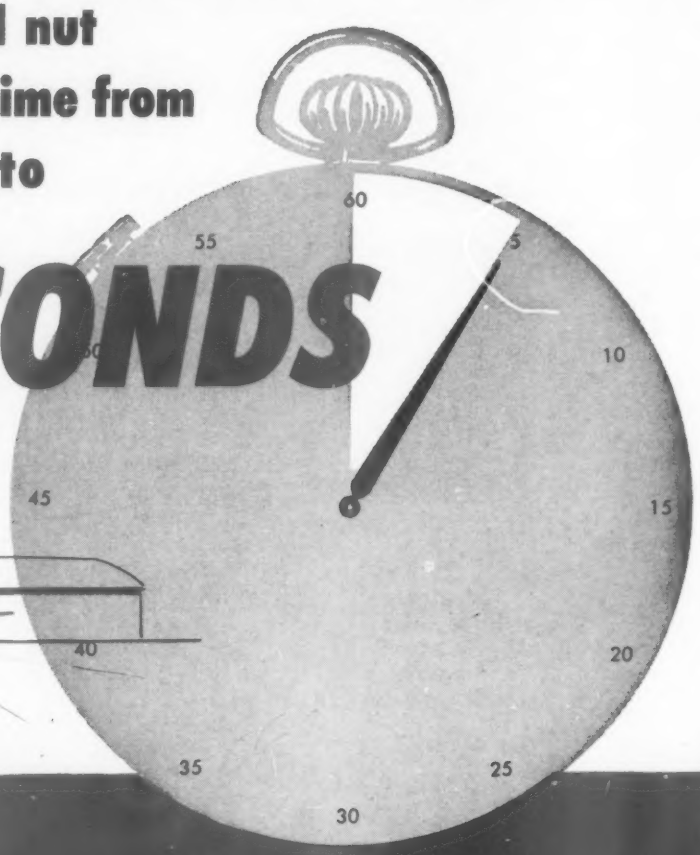
Matt E. Hartz

Managing Editor

CUT MAINTENANCE COST!

we've reduced nut replacement time from 20 MINUTES to

5 SECONDS



with NUTT-SHELLS Item

TIME S

A PRIME WEAPONS SYSTEM CONTRACTOR SAYS:

"Three per cent of all plate nuts and bolts replaced due to installation damage. Cost records show that it takes two men 10 minutes each to replace a [illegible]

This new Nutt-Shel line effects even greater time and cost savings during subsequent servicing and maintenance of any weapons system.

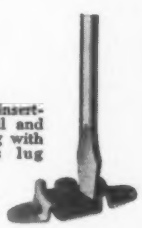
HERE'S THE *5 SECOND* METHOD

1

Insert removal tool, with downward pressure, between nut and shell, as shown. Lean tool against nut barrel to insure engagement.

2

Maintain downward pressure. Nut will snap out easily with a simple prying motion.



3

Install new nut by inserting one lug in shell and striking opposite lug with screwdriver. This lug snaps into place.

MAKE THIS SIMPLE TEST YOURSELF

If you have a fastening problem in airborne weapons systems, write today for this demonstration plate and tool. No obligation.

Low Cost	No more than the nuts you are now using.
Light Weight	As light or lighter than anything available.
Accepted	Meets latest military requirements.
Available	Available in all popular thread sizes, we ship from stock.

Only One Inexpensive Removal Tool Is Needed

Only one inexpensive removal tool, (in two sizes) is needed, to handle the five most used thread sizes in the nine styles of self-locking nuts in the TIMESAVER line. This procedure may be repeated as often as necessary without impairing performance. The same nut element is used, and may be replaced, in *all* standard styles. Even the spacer nuts are interchangeable. This is not only a convenience for you; it means a reduction in your stock problems.

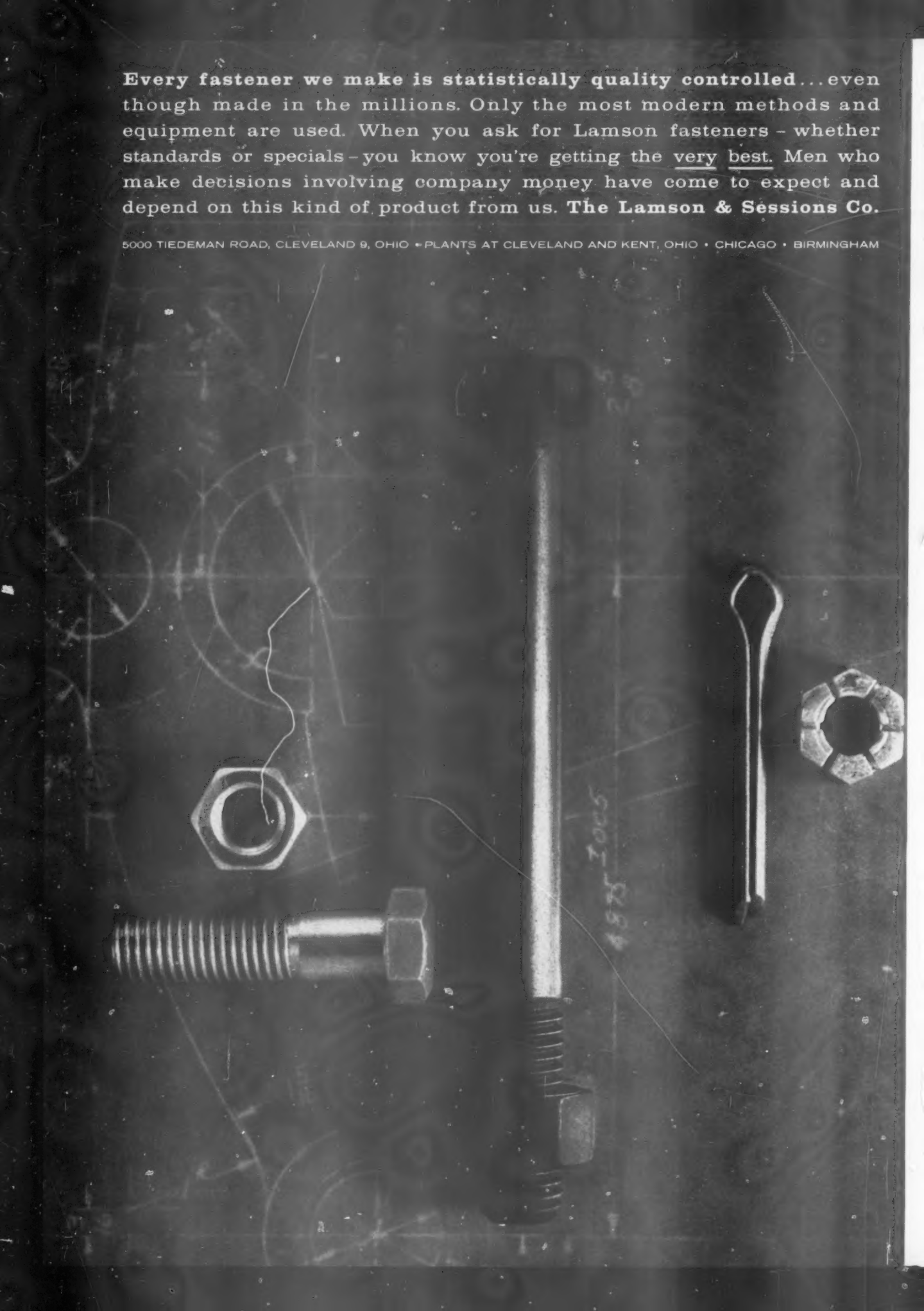
Nutt-Shel
An SPS Company

2701 S. Harbor Blvd.
Santa Ana, California
Kimberly 5-9311

FASTENERS FOR AIRBORNE WEAPONS SYSTEMS

Every fastener we make is statistically quality controlled...even though made in the millions. Only the most modern methods and equipment are used. When you ask for Lamson fasteners – whether standards or specials – you know you're getting the very best. Men who make decisions involving company money have come to expect and depend on this kind of product from us. **The Lamson & Sessions Co.**

5000 TIEDEMAN ROAD, CLEVELAND 9, OHIO • PLANTS AT CLEVELAND AND KENT, OHIO • CHICAGO • BIRMINGHAM



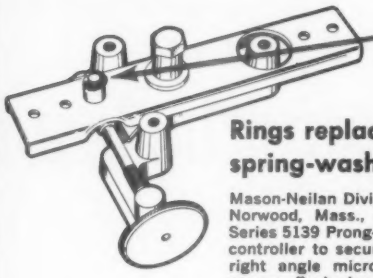
Waldes Truarc Prong-Lock Ring Eliminates Springs, Washers, Takes Up End-Play

WALDES TRUARC
SERIES 5139 RETAINING RING*

application: external for shafts
range: 3/32" through 7/16"

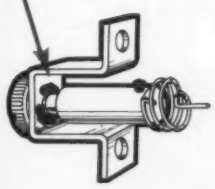
*U. S. Pat. No. 2,755,698

After radial application, the Waldes Truarc Prong-Lock retaining ring locks and holds securely in its groove by means of two prongs. Because of its resistance to radial displacement, the ring may be used as a shoulder for rotating parts. Thrust-load capacity ranges from 80 to 700 lbs. for sizes from 3/32" to 7/16". Bowed construction provides end-play take-up, often eliminating springs, washers and accessory devices.



Rings replace cotter pins, spring-washers; save $68.00/M

Mason-Neilan Division of Worthington Corp., Norwood, Mass., uses two Waldes Truarc Series 5139 Prong-Lock rings on its pressure controller to secure pivots through which a right angle micrometer adjustment screw passes. Each ring replaces hairpin-type cotter pin and bowed washer.. provides necessary tension to prevent adjustment screw from shifting. Manufacturing costs were reduced by $68 per 1,000 units.



Ring replaces locknut, eases control calibration

On a differential pressure control mechanism, Taylor Instrument Companies, Rochester, N. Y., replaced a locknut and eliminated a costly threading operation with a series 5139 Prong-Lock ring. Also eliminated is the loosening and tightening of the locknut before and after each calibration setting. Spring action of the ring securely holds the calibration setting.

Whatever you make, there's a Waldes Truarc Ring designed to save you material, machining and labor costs, and to improve the functioning of your product.

In Truarc, you get:

Statistically Controlled Quality from engineering and raw materials to the finished product. Every step in manufacture watched and checked in Waldes' own modern plant.

Complete Selection: 36 functionally different types. As many as 97 standard sizes within a ring type. 5 metal specifications and 14 different finishes. All types available quickly from leading OEM distributors in 90 stocking points throughout the U. S. and Canada.

Field Engineering Service: More than 30 engineering-minded factory representatives and 700 field men are at your call.

Design and Engineering Service not only helps you select the proper type of ring for your purpose, but also helps you use it most efficiently. Send us your blueprints today . . . let our Truarc engineers help you solve design, assembly and production problems . . . without obligation.

⊕ 1

WALDES
TRUARC®
RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, N. Y.

Waldes Kohinoor, Inc., Long Island City 1, N. Y.

Please send me additional information and engineering data for the Truarc Prong-Lock Ring, Series 5139.

Name_____

Title_____

Company_____

Business Address_____

City_____ Zone____ State_____

AFE-100

Consult the Yellow Pages of your Telephone Directory for name of Local Truarc Factory Representative and Authorized Distributor. Look under "Retaining Rings" or "Rings, Retaining."

Use postpaid card. Circle No. 208

PARKER-KALON DIVISION, *General American Transportation Corporation, Clifton, New Jersey*

PARKER-KALON® "Hi-thred" Self-tapping Screws

For the first time in fastener history—Parker-Kalon introduces Self-tapping screws THREADED FULL TO THE HEAD . . . THE LAST THREAD ACTUALLY TERMINATING IN AN ANNULAR ORIFICE IN THE HEAD ITSELF . . . the new P-K *"Hi-thred"* fastener!

It's a completely new idea in fasteners—a screw that reduces annoying and costly slow-downs—holds securely *without spinning or slipping*—even in very thin gage metal sheets.

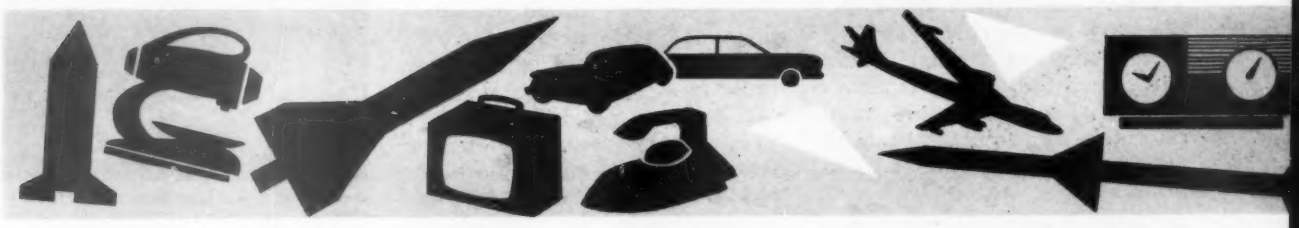
Compare the new P-K® "Hi-thred" with any conventional fastener. See for yourself the incomplete last thread on ordinary screws. Then see how the revolutionary P-K "Hi-thred" is constructed to give you firm, dependable fastening right to the head of the screw.

You can obtain samples from your nearby Industrial Supply Distributor, or write direct to P-K. "Hi-thred" fasteners are available in Types "A" and "Z" in production quantities in non-countersunk head styles.

Look...it's threaded right into the head!

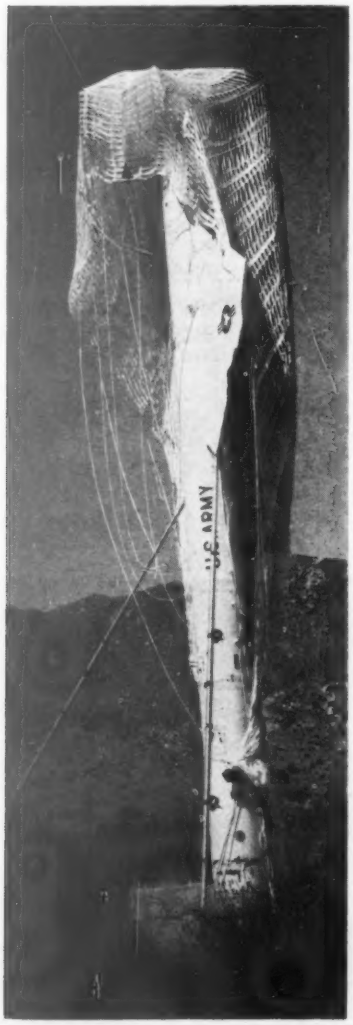
Another new fastener idea from Parker-Kalon

Industry at Work



RECOVERABLE SUPERSONIC TARGET MISSILE CHEERS TAXPAYERS

Rugged Kingfisher suffered only blistered paint after being "shot down" by air defense missile. The test target's recovery system includes a parachute and long nose spike which buries itself deep in the desert upon impact.



Taxpayers benefitted all the way around as success marked the nation's first realistic test of an air defense missile against a specially designed supersonic target. The Talos intercepted and "downed" the Kingfisher, recovered intact for use again.

This feature of the Army's program at White Sands Missile Proving Grounds, N.M., permits testing of defensive missiles at only a fraction of the cost of using destructible birds. The 38-foot Lockheed Kingfisher is equipped with a radar antenna which enables it to simulate aircraft or missiles up to five times its size.

The intercept was registered by Lockheed's unique electronic device known as a firing error indicator.

NEW MISSILE PARTS PLANT TO BE HOSPITAL OPERATING-ROOM CLEAN

A factory with hospital operating-room cleanliness! Well, not quite, but close. A unique "space age" plant will be opened in May, 1959, for the manufacturing and assembly of components and assemblies of missiles in Grand Rapids, Mich.

Controlled environment—including the battle against rust and dust—is essential in the new Lear, Inc., facility, which will develop and produce stable gyro platforms for both Bomarc and Nike-Zeus and the servo control units for the Sergeant.

Humidity must be controlled to prevent the slightest trace of rust in the final product; temperature must be controlled to maintain fantastic tolerances—even a microscopic fleck of dust can cause a missile to stray off course.

Covering 172,800 square feet, the $2 million building will maintain positive air pressure so that dust cannot enter when doors are opened. Ceilings are of vinyl-covered acoustical tile, with light fixtures

flush-mounted to prevent dust gathering. The interiors will be colored to reflect all possible light from high-intensity 140 foot-candle lighting.

Employees will wear only company provided footwear and nylon clothing and before entering, they will be literally blown free of dust as they pass an electric eye which starts an overhead blower and floor-mounted vacuum cleaner. During hot weather the building roof may be flooded to maintain environment.

INSTANT ACCELERATION TO 18 G's ON MISSILE TEST RAILS

From a dead stop, the Lockheed X-7 missile surges forward at an acceleration that would crush your body under two tons of weight, hits top speed, then slams to a stop equivalent to a 60 mph headon crash into a solid brick wall.

All this is only .04 of a second—and two feet of travel.

The "G-Shooter," a special rail platform, permits this rugged ground testing of components before launching. Instant acceleration to 18 Gs—18 times the force of gravity—is achieved by building up pressure of 2100 lbs. per sq. in. in a cylinder containing a piston. Pressure is released, piston flashes forward, pushing missile down the steel ribbons. Eight bands of nylon webbing under the rails absorb the shock, snap as planned to prevent rebound, and stop the "bird."

Testing takes place at Holloman A.F.B., N.M.

DARING GM FIREBIRD FEATURES SINGLE STICK CONTROL

General Motors' Firebird III is the first car ever designed around a single stick control system which eliminates the conventional steering wheel, brake pedal and accelerator. Successfully tested, the two-passenger, gas-turbine powered car is only 44.8" high.

Tools of the space age—electronics, transistors and computors—are employed to guide the car automatically and control passenger comfort. Its most significant feature, its control system, features the single-stick Unicontrol, a wing-shaped handle mounted atop a 4" control stick located in the center of the car and easily operated by either passenger. It combines all steering, braking, accelerating, parking.

The main engine is a 225 horsepower Whirlfire GT-305 regenerative gas turbine. With a 119" wheelbase and 57" front and rear treads, overall car length is 248.4". Ground clearance is 6.35". The unusual brake system features wheel and brake drums combined in a single aluminum alloy casting.

First public display will be Oct. 16 at the GM Motorama at the Waldorf-Astoria Hotel in New York City. It shows again Nov. 8 in Boston.

Lever-acting swivel front seats are featured in Chrysler Corporation's 1959 line, but not forgotten is a center front seat. Passenger comfort is provided with an arm rest.

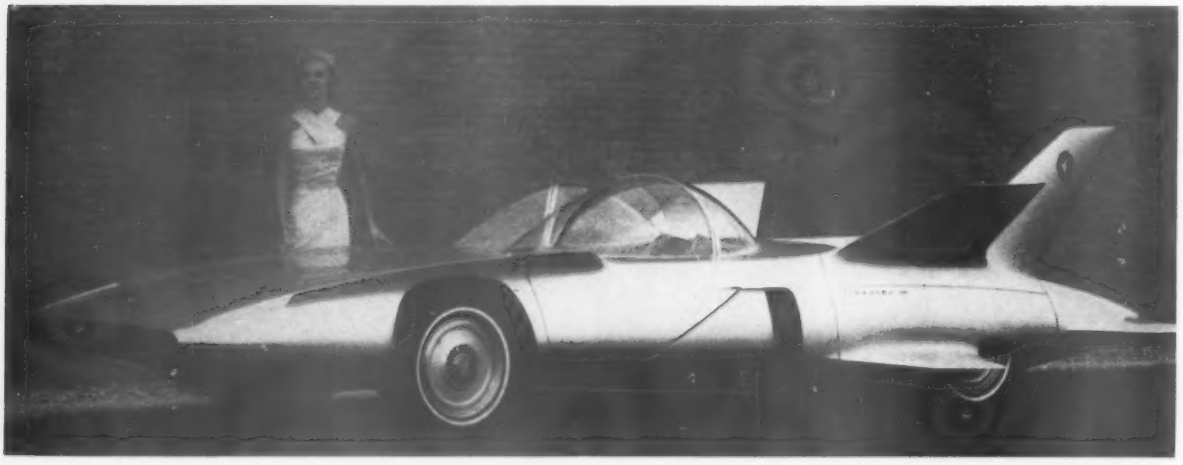
LE TOURNEAU SCRAPER MOVES 100 CUBIC YARDS

The largest self-propelled earth-moving scrapers ever marketed are currently being displayed at the American Mining Congress in San Francisco.

In the 70 and 125-ton class, the Goliath marks the return to this field by R. G. LeTourneau, Inc., which sold out its previous line in 1953. The new scrapers have a cubic yard capacity of 50 and 100 yards compared to the average conventional model capacity of 15 cubic yards, with some 35 yard capacity machines.

Major innovation on the scraper is an individual electric motor geared directly to the inner rim of each wheel, providing greater traction and working power under payload. Power is supplied by a 600 hp diesel electric dynamo.

Space age experimental car, Firebird III, stands only 44.8" high.



Automatic feeding and setting with...

T-J

Speeds up riveting and clinching!

It's a quick step to *faster assembly* and *reduced labor costs* when you put T-J Rivitors and Clinchors in your production picture! These performance-proved machines are suited to a wide range of assembly jobs for aircraft, automotive, farm machinery riviting jobs of all kinds.

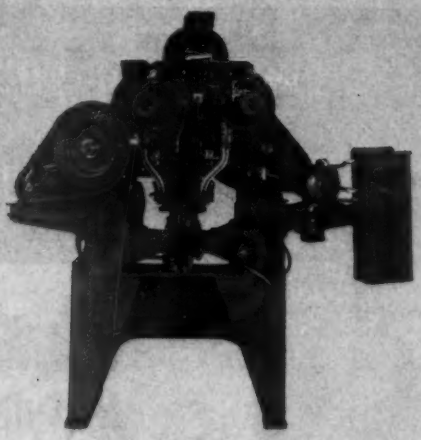
T-J RIVITORS automatically feed and set solid rivets with high production. Electrically powered Rivitor sets solid steel rivets up to 7/8" long. Throat depths 8" to 36".

T-J CLINCHORS set clinch nuts with fully automatic operation, controlled by a single foot pedal. Available in Underfeed and Gravity feed models, throat depths 8" to 36".

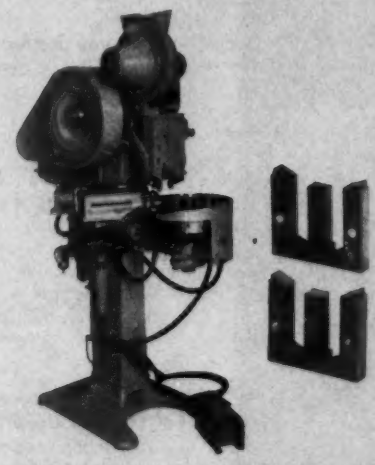
Send today for these helpful references: Rivitor bulletins 646 and 555 . . . Clinchor bulletin 555. The Tomkins-Johnson Co., 627 N. Mechanic St., Jackson, Mich.

T-J TOMKINS-JOHNSON

RIVITORS · AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHORS



RIVETS 4 AT A TIME! Special quadruple riveting unit, incorporating two Model "RR" Twin Rivitors, mounted on a special welded steel base. Equipped with air-operated hold down mechanism and a safety air trip arrangement. Tooled for riveting left hand and right hand automotive muffler bracket assemblies.



SPECIAL TWIN RIVITOR! Tooled for 6 station indexing fixture, incorporating automatic clamping and ejecting mechanisms, for riviting laminated armature assemblies.

T-J CLINCHOR adaptable to a wide range of clinch nut setting problems. Gravity feed model shown here.

Use postpaid card. Circle No. 210

COMPUTER CARDS DEAL— RIVETING MACHINE ACTS

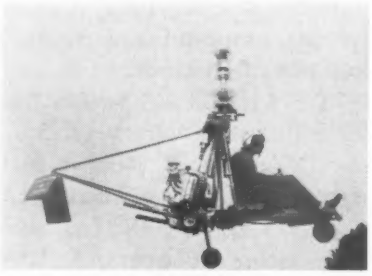
There's no gamble to it when a deck of cards deals a giant ten-ton riveting machine into operation, according to two Lockheed Missile Systems division automation specialists.

The "stacked" deck of cards—actually punched computer cards—is part of an automatic control system worked out by Ralph Borsos and Henry Lakin for a huge 30′ by 70′ automatic riveting machine at the Lockheed Aircraft Corporation, Burbank, Calif., plant.

In the system, a human operator feeds instructions for a planned machine-tool operation to a high speed electronic computer. The computer translates these directions into a coded common language, onto a punched control deck of cards that is inserted into the riveter.

Obeying the commands on the cards, the riveter is then on its own in turning out the required parts. It even corrects human errors and makes necessary adjustment without the aid or advice of the operator.

DESIGN REMOTE CONTROL FOR ONE-MAN HELICOPTER



A radio-controlled remote control system is being built for the Gyrodyne XRON-1 Rotorcycle by Lear, Inc.

The unmanned helicopter could be used in numerous military and commercial ways: as an elevated portable searchlight platform, for carrying mail and supplies between ships, for TV reconnaissance.

Operated by a ground man, the system can put the copter through every movement and speed of which the vehicle is capable. The Rotorcycle was co-winner of a 1954 Navy design competition for

an ultra-small, lightweight (400 lbs.) and economical one-man helicopter.

AIR HARDENING STEEL WITH 280,000 PSI

John M. Hodge, metallurgical engineer, holds samples of new alloy he developed at U.S. Steel.

Airsteel X-200, an ultra-high-strength alloy sheet steel, was developed to surmount welding and fabricating problems in steel used for missiles and space vehicles by U. S. Steel's Research Center in Monroeville, Pa.

The new air hardening material, when cooled in air and tempered, develops tensile strength levels in the 280,000 lbs. psi range without requiring oil or salt quenching.

U. S. Steel plate and sheet mills produce Airsteel in the annealed or "soft" condition, which allows easy forming, cutting or shaping to desired missile configuration.

LIST NATION'S 523 RUSTIEST CITIES

What is the rust loss rate for your city?

The first Rust Index of the United States lists 523 cities with a population of more than 10,000 and their comparative rust rates, published by the Rust-Oleum Corp., Evanston, Ill., rust-preventing coating makers.

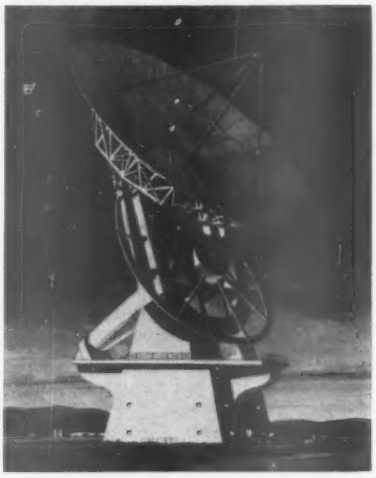
It takes three years, the fastest rate in the country, for rust to corrode a standard, uncoated steel test panel the size of an auto license plate, in four different cities—Buffalo and Rochester, N.Y.; Erie, Pa., and Miami, Fla. Slowest rust rate, more than 15 years, is in Tucson, Ariz.; Roswell and Santa Fe, N.M. In all major industrial centers the rate is under four years. The research project

took into account variations in rainfall, wind, corrosive gases, sunlight and salt water in each locality. The report estimates the nation's annual rust bill at $7½ billion, an increase of $2 billion over the toll a decade ago.

In 221 of the cities tested (42%) the panels rusted in less than four years and in 95 cities (18%) between four and five years.

Other sample rankings: 8th—Pittsburgh, Pa. (3.01), 11th—Los Angeles, Calif. (3.02), 17th—Cleveland, Ohio (3.03), 29th—Chicago, Ill. (3.05), 47th—New York, N.Y. (3.06).

RADIO TELESCOPE TO PROBE SPACE SECRETS



A $5 million radio telescope being built in Green Bank, W. Va., will be able to pick up radio waves transmitted from objects in space many times further than the largest optical telescope can see.

To be available by mid-1960 for all astronomers who can benefit from its radio wave receiving power, the giant instrument was authorized by Congress for the National Science Foundation.

It can help give answers to questions on the creation of the universe, what distant stars are made of, information on colliding galaxies and solar flares.

The instrument combines massiveness with precision. The "dish" which scans the sky is 140′ in diameter, weighs 350 tons and at its arc is 205′ above ground. The polar axis shaft, which must always be exactly parallel to the earth's north-south axis, weighs 780 tons.

EATON-RELIANCE cost-reducing fasteners do the job easier, faster, surer

When you choose industrial fasteners for any type job, you look first for two things—QUALITY and PRICE. Eaton fasteners give you both. Eaton quality is the result of many years' experience, high engineering standards and an efficient quality control system. Eaton also gives you production and service geared to your schedules. The Eaton price is low--consistent with high quality—because machinery is modern, employees are skilled, and the raw steel is cold drawn, cold rolled and heat treated to rigid specifications.

Eaton-Reliance Industrial Fasteners are truly fasteners to be relied on. Design and industrial engineers in major fast-moving industries such as automotive, farm implement, construction machinery, appliance —to mention a few—call for Eaton quality fasteners on many varied types of assemblies.

An examination of our complete line, described in Engineering Bulletin 4K/3, will show you the wide range of types available and give you fresh ideas on cutting your fastener costs; send for a copy today, or request one of our industrial fastener engineers to call. There is no obligation.

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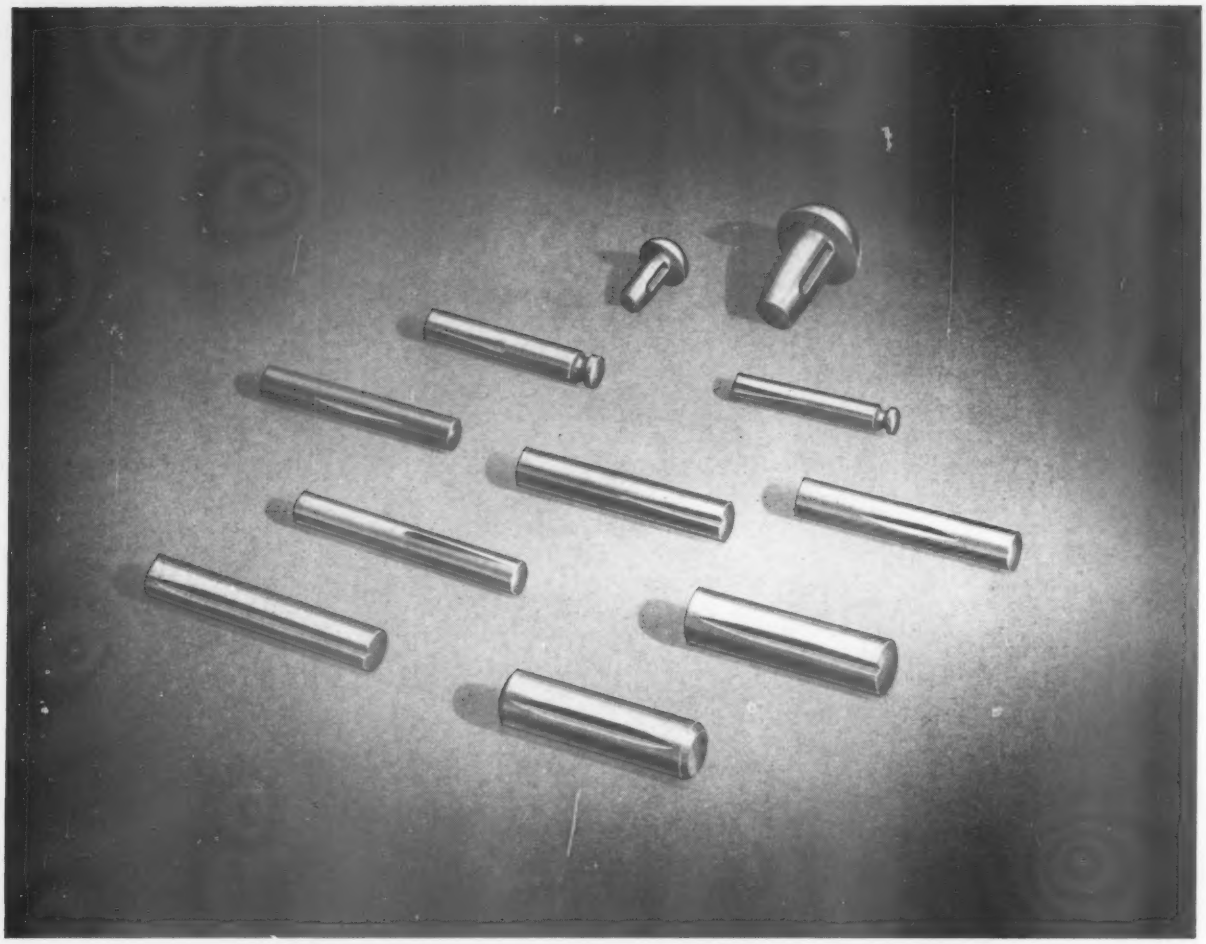
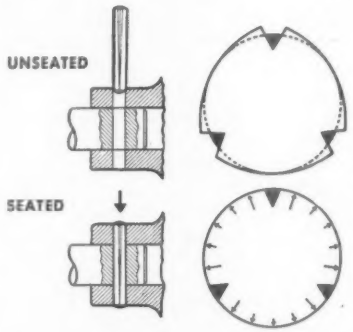


The surest, safest way ever developed to pin two parts together...

THE SOLID GROOV-PIN

Just drill the hole and drive the Groov-Pin home . . . once seated, it stays there, no matter what the conditions of shock and vibration. Yet it can be drifted out and reused with but little loss of its original holding power. No reaming is necessary. Available in nine different types, as well as in drive studs. Diameters from 1/32" to 1/2" and larger for special requirements, in a wide variety of materials. There's a Groov-Pin for every need, including the Type 3H for hopper feeding, and Types 6 and 7 for anchoring tension springs. Standard prices apply to specials in lots of 5000 or more.

Write today for free samples and the new 32-page Groov-Pin catalog... yours for the asking, it belongs in every designer's file of fastener reference literature. Address Groov-Pin Corporation, 1135 Hendricks Causeway, Ridgefield, N. J.



The unique GROOV-PIN locking principle

When a Groov-Pin is driven, the material displaced by the grooves is forced to flow back, setting up a powerful locking force. The ability of Groov-Pin to hold under severe shock and vibration . . . and its immunity to vibration fatigue . . . has been thoroughly proved by the billions in use!

GROOV-PIN

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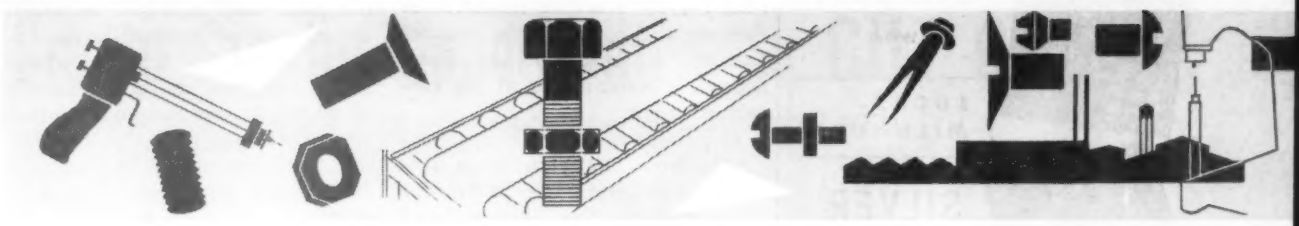
Assembly and Fastening Ideas



TILT STATION FACILITATES TV ASSEMBLY

Fastening a completed television chassis in proper position within the cabinet is a simple operation at television-radio division of Westinghouse Electric Corporation, Metuchen, N.J.

A cabinet, preassembled on its paperboard shipping pallet, moves down the assembly conveyor to an air-operated tilt section. Here the operator checks the chassis position which is jigged in the tilt fixture. She pushes twin buttons which activate an air cylinder which vertically rotates the fixture, exposing the perforated pallet.

Next, she fastens the chassis to the cabinet with self-tapping screws, using an air-driven screwdriver. Finally, the operator releases a safety catch and presses a "return" button. The tilt section returns to normal positions from which the tv set and pallet is shoved off the skate-wheel section and back onto the roller conveyor.

AUTOMATIC TRANSFER IN STARTER ASSEMBLY

Commutators for vehicle engine starters can now be automatically transferred from a loading point into a riveting press, and then to the chuck of a rotary table reaming machine, at the rate of 500 an hour. Pneumatic transfer equipment is doing this at a large British electrical manufacturer's works.

Formerly an operator unloaded an air press and placed the commutators on a conveyor, while a second operator took them from the conveyor, loaded the hydraulic press, took the commutators off and placed then on the reamer.

The commutators are now taken from the air press, which slightly spreads the central sleeve, and hand loaded onto a chain conveyor. They are then

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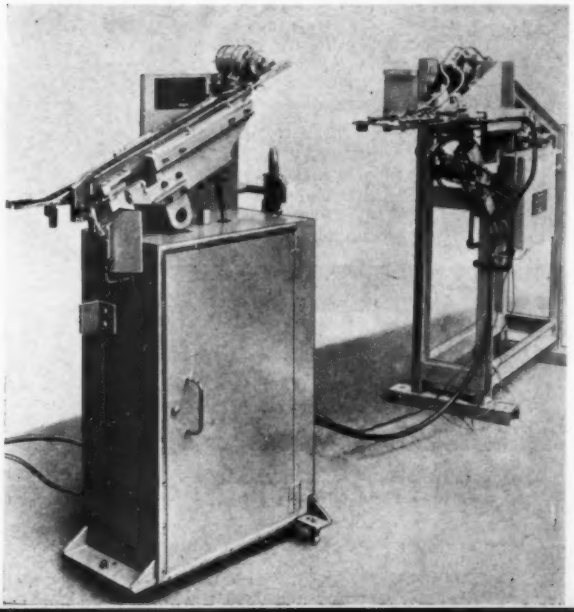

conveyed to a pneumatically-operated feeding hand which places them into a hydraulic riveting press which completes the spreading operation.

A pair of rails picks up the commutators from the press and slides them into the chuck of the rotary table reaming machine. A cam on the rotary table ensures that the reaming machine chuck accepts a commutator at the correct moment.

The chain conveyor is operated by a pneumatic ram on a mechanical ratchet. The pneumatic rams operate the feeding hand and the hydraulic press is triggered off by a pneumatic ram which presses the starting button.

To avoid any possibility of the various feed motions getting out of step, the cam on the reamer rotary table controls each feeding cycle separately, the hydraulic press acting as a slave. A small buffer stock of commutators may be built up on the chain conveyor, but they will be passed through the press only at a rate at which the reamer can accept them.

The pneumatic transfer equipment, operates on an air supply of 80 psi. It was designed so that it was unnecessary to move either the two presses or the reamer from their positions when they were manually loaded.

The transfer equipment was designed and made by Hymatic Engineering Co., Ltd., of Redditch, Worcestershire, England.

NUTS FOR JET ENGINES OPERATING UP TO 1400 F

For new jet engine developments, a nut series with a temperature range up to 1400 F has been developed. Made by Boots Aircraft Nut Corp., the nuts use M-252 material.

The 12-point Star Lok is fabricated in hi-beam configurations for standard and .003″ reduced p.d. bolts. The hexagon Jet Lok has a slotten beam principle in hi-beam configurations for standard and .003″ reduced bolts. The light-weight Life Lok features low silhouette configuration for fixed and floating anchor nuts and gang channel applications. Its re-usability at cherry red temperatures comes from out-of-round normalization using stress relieving cutaways at each ellipse apex.

Boots is aiming for higher temperatures—near 2000 F.

CONVEYOR HANDLES PARTS SAFELY AT ANY ANGLE

Stampings, fasteners and other metal components can be delivered to the assembly line in a vertical as well as horizontal plane with a magnetic conveyor-elevator. It does the job safely and fast with the aid of bolt-together parts called Magna-Rail. It is made by Eriez Mfg. Co.

The new conveyor consists of 4″ wide rails which are actually continuous magnetic face-plates of non-electric Alnico V castings.

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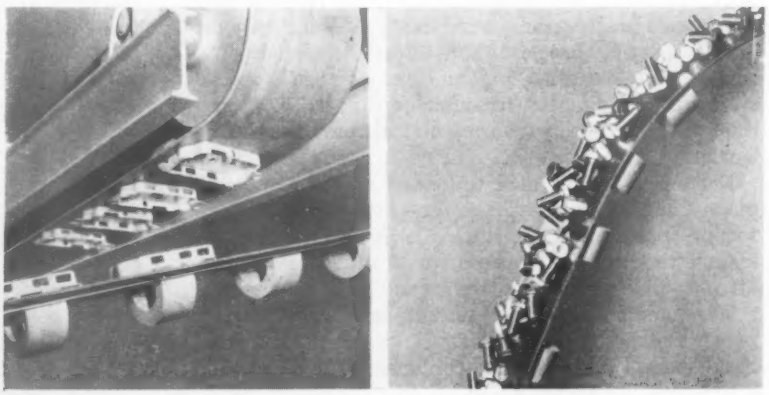


Non-electric magnetic conveyor carries parts on underside or up inclines.

"Customer Savings" is the Reason this is the Best Year in Setko's 23-Year History.

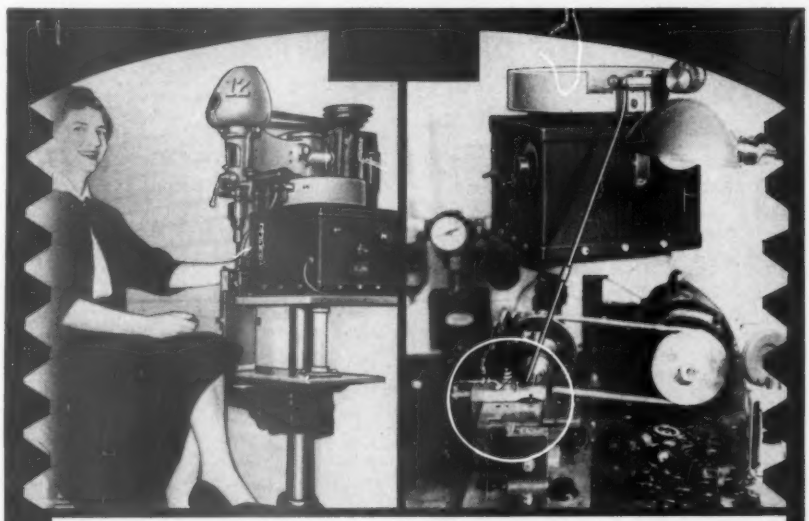
Set Screw News

& Mfg. Co.

We specialize in Solving Puzzling Set Screw Problems

Issue No. 7 | Bartlett, Illinois (Chicago Suburb) | Automation Edition

Now... New Developments in Set Screw Automation Create Greater Opportunities to CUT COSTS!

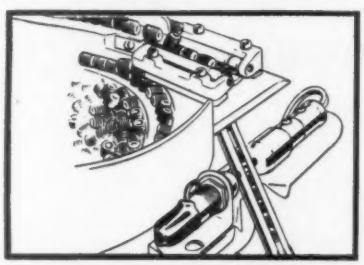


Setko System Includes Both Special Automatic Feeding Mechanisms and Specially-Designed Headless Set Screws for Hopper Feeding

The Setko System is outstandingly practical in quickly "automating" *present* operations.

The left hand photo above shows the Setko System used in a vertical feeding operation. The photo at upper right is the horizontal feed Universal Model. The adjustable work table (in circle) eliminates need for separate fixtures for each type of work. This model can also be completely automated to include automatic driving. Setko Systems provide hopper feeding of headless set screws as small as #2 (.086 x ⅛" long).

Through use of new Setko Systems—employing the exclusive Setko Automatic Hopper-Feeding Unit and specially-designed Hopper-Fed Headless Set Screws—you can "automate" many types of machines and equipment with immediate, substantial savings in each operation.



From a vibrating hopper, this roller device automatically positions Headless Set Screws right-side-up. Available for either vertical or horizontal applications with drill presses, vertical tapping machines, rotary machines, etc. Shown is the photoelectric cell which controls the flow of screws into feed tube.

*Pat. No. 2,638,945

AVAILABLE IN 3 DIFFERENT TYPES OF SET SCREWS

HEXAGON AND FLUTED SOCKET SET SCREWS | SLOTTED SET SCREWS | SLABBED SET SCREWS

NEW ... 2 methods of feeding, vertical and horizontal!

NEW ... Photoelectric cell control of screw flow!

NEW ... Even nested screws can be hopper-fed!

NEW ... Microswitch control of driving!

NEW ... Adjustable work table that eliminates individual, high-cost fixtures for each type of work!

Here's why the Setko System of feeding and orienting Headless Set Screws is really "catching on" with manufacturers from coast to coast:

1. **Requires only 1/5th to 1/10th the time required for former methods**
2. **Automatically rejects misfits**
3. **Eliminates cross-threading, floor loss**
4. **Cuts set screw inventory**
5. **Takes up less floor space**
6. **Works with both metals, plastics**
7. **Takes all special Setko Set Screws, including Self-Tapping, Self-Locking, Nu-Cup, etc.**
8. **Makes possible faster deliveries**

Here's What Users Say...

"Hopper Feeding saved us $42,000 in first year."

"Our production rate went from 300 to 2000 per hour."

"Our floor loss went from 30% to 0."

FREE DEMONSTRATION

Quickest way to get complete understanding of the Setko System is to see it! You're welcome to visit the factory for a free demonstration... or ask for the free loan of the new 12 minute, 16mm color movie on Setko System. For details and free copy of Catalog 23, containing complete data on the Setko Hopper-Fed* Headless Set Screw System, mail coupon — or write direct. 1489RRR

SET SCREW & MFG. CO.
705 Main St., Bartlett, Ill.

Please send your new Catalog 23. Also:

☐ Advise how and when I can see Setko Systems demonstrated.

☐ When can I borrow the new Setko movie for showing in my plant or office?

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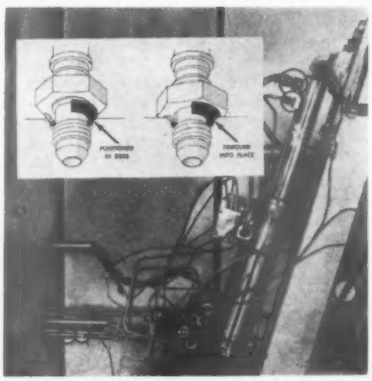
Once in position it maintains a constant magnetic field through the whole working surface of the moving belt. Metal objects adhere firmly at high speeds, up or down inclines, or even suspended from the belt's under side.

SELF-SEALING THIN SHIM CREATES OWN LUBRICANT

A thin shim of Teflon—whose natural properties create a permanent lubricant—is now being used in a self-sealing fastener designed for aircraft applications. The shim is set in an "O" ring grove in cold-headed stress fasteners. It absorbs friction between the metal and the ring during application and subsequent use, preventing "cold flow" and abrasion. Aero-Stat Company makes the fastener which is designed for possible re-use without loss of sealing power.

LEAKPROOF STATIC SEAL FOR HYDRAULIC FITTINGS



Looking much like an ordinary washer, a static seal has speeded up the development of some important missile and airplane control systems.

The seal makes hydraulic fittings leakproof through a wide range of temperature and pres-

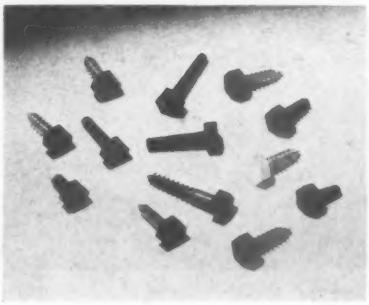
sure. It has cut down the time needed for testing many hydraulic systems by as much as one-third. It markedly increases the reliability of automatic control systems, according to Autonetics, a division of North American Aviation, Inc., of Downey, Calif., who designed the seal.

Testing of hydraulic components of navigation and other automatic systems consumes a large part of the cost and time of prototype programs. In the past, after setting up a test in an environment chamber, failure would sometimes occur because of a seal leak.

The new seal, called Natorq, deforms and becomes an integral part of the fitting with the application of torque. The fitting can be disassembled repeatedly without loss of seal efficiency. Tests indicate that it is effective from a minus 360 F to plus 1200 F, depending on material used, and from 0 to 10,000-plus psi.

It is being marketed by Navan Products, Inc., of Santa Monica, Calif.

PLASTIC-HEADED FASTENERS FOR ELECTRONICS INDUSTRY



Metal fasteners with plastic heads are now available for use in the electrical and electronic industries. They offer design engineers a fastener with the mechanical advantages of metal and the insulating advantages of plastic.

The plastic head also provides sealing at critical points and prevents corrosion. The fastener heads are non-galling when used on easily-marred surfaces. Gries Reproducer Corp. produces the vari-colored units on high-speed machines which mold the heads to the screws.

Solid steel bar, above, was replaced by the channel fastener, below, at a big savings.

G-E CUTS HIDDEN COSTS IN DISHWASHER ASSEMBLY

Seemingly simple assembly methods can sometimes be the reason for unnecessarily high manufacturing costs. The dishwasher-disposal department at General Electric's Appliance Park, in Louisville, made this discovery on their counter-top dishwasher unit.

Their method of mounting the roll-out wheels to the cabinet and track called for a simple steel bar, drilled and tapped, into which the roller wheel assembly was screwed. Simple enough, but there were hidden costs that when eliminated could save thousands of dollars over the model run.

After analyzing the assembly procedure and costs of making the mounting bar, it was discovered that a spring steel Speed Nut channel fastener with self-contained, self-locking, thread-engaging impressions could do the job with a cost reduction of about 75 percent. In this instance the cost of the fastener was less than that of the simple part it replaced.

The former method called for a 10-45 high carbon solid steel mounting bar. This material was not readily available in relatively small quantities, and therefore, was expensive. The quality of steel, however, was available in the lightweight fasteners, and at low cost. Drilling and tapping were eliminated, as well as the double face milling at one end of the bar. Aside from the reduction in manufacturing costs, the weight savings brought additional savings in shipping costs.

Moral: The important consideration in assembly engineering is not the cost of the fastener, but the manufacturing costs that result through its use.

SPIN-RIVETER SIMPLIFIES TERMINAL BOARD ASSEMBLY

Riveting turret terminals into a punched or drilled terminal board is a simple task for a new spin-riveting machine developed for this purpose by Hill Machine Company, of Rockford, Ill.

By means of a special hopper feed, the terminals are presented underneath the machine table. Pressure on a double-action foot controller raises the anvil and places the terminal into the hole selected by the operator. Further foot pressure brings down the spinning, air-operated pein with

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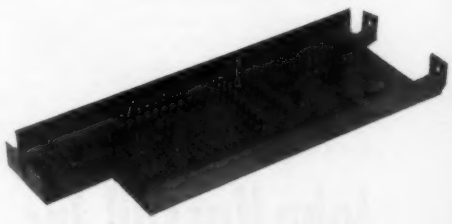

automatically controlled impact, position of anvil and speed, and number of blows. The machine controls the uniformity of riveting, requiring no special skill or judgment of these elements on the part of the machine operator.

Results from an early installation indicate that cracking and splitting of terminal, particularly the stand-off and feed-through types, can be virtually eliminated.

ASSEMBLE 1200 MOPS AN HOUR WITH NUTSETTER

Sponge mop assembly has been increased to 1200 an hour at the O-Cedar Division of American-Marietta Co., Chicago, thanks to a new Thor two-spindle nutsetter.

The machine feeds and runs down two wing nuts automatically to fasten together the sponge mop frame and sponge refill. It has two air-driven nutsetters with nut-tension control. An electrically-driven vibratory unit feeds two wing nuts into position to be run down by the machine, which is activated by a foot valve.

Nut tightness and nutsetter torque are controlled by an air regulator. Nutsetters automatically raise when the units are driven, permitting removal of the mop and insertion of another sponge and frame.

SOLDERED JOINTS TESTED BY VIBRATION ON ASSEMBLY LINE

Faulty soldering on air conditioning units—resulting in refrigerant leakage and customer complaints—can now be detected on the assembly line.

The problem has been solved for one manufacturer in unique fashion by the Cleveland Vibrator Co., who fabricated a vibrating roller conveyor section for an air conditioning assembly line.

In the past, soldering flaws which were strong enough to stand up under the 400 psi pressure test, would loosen under the jolts of shipping and would not show up until after installation.

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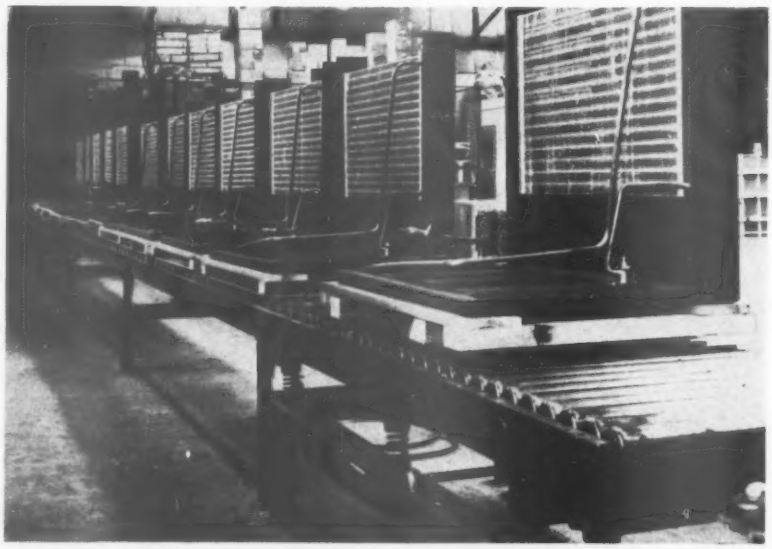
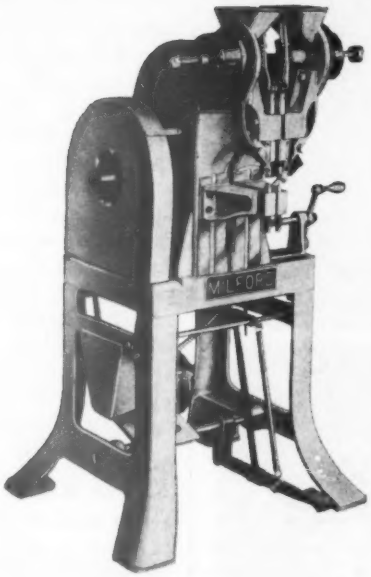
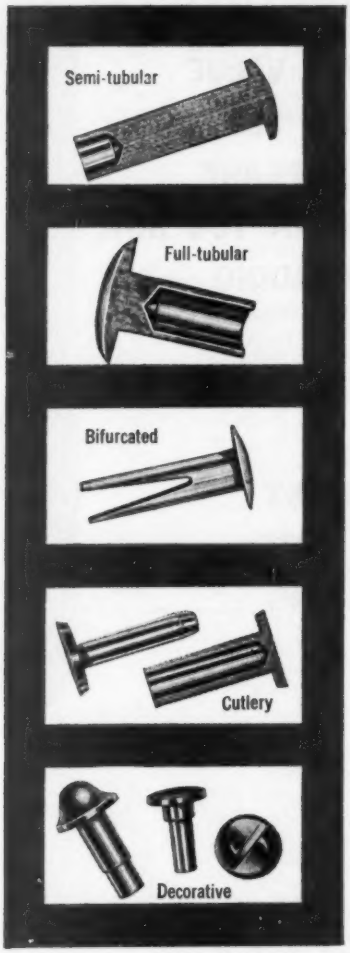


Section of assembly conveyor, foreground, fatigue-tests air conditioning units.



High strength and uniform quality are extremely important when tubular rivets are used in automatic assembly. Trouble-free operation is the only way to be sure of the cost savings resulting from mass production and automatic fastening.

To cut delivery time and production costs . . to improve product appearance and strength . . . to assemble your product on automatic rivet-setting machines—*get in touch with Milford first!*



AUTOMATIC ASSEMBLY IS FAST, ECONOMICAL AND TROUBLE-FREE WITH MILFORD TUBULAR RIVETS

To give you unmatched delivery service on tubular rivets, Milford has five *manufacturing* plants and twenty sales offices strategically located across the country's industrial beltline.

THE MILFORD RIVET & MACHINE CO.

MILFORD, CONNECTICUT • HATBORO, PENNSYLVANIA • ELYRIA, OHIO • AURORA, ILLINOIS • NORWALK, CALIF.

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Installed just before the condenser units go into the pressure test booth, the new vibrating section subjects each unit to one minute of violent shaking. Any faulty connections then stand out in the pressure test.

The section is made up of a standard roller conveyor top and base. The roller top is supported by four stiff coil springs, which amplify the vibration. A vibrator is bolted to the longitudinal structural member of the conveyor top. It operates on 80 pounds of air pressure, delivering 1000 blows a minute.

SOLAR WELDS METAL FOIL INTO AIRFRAME SECTIONS

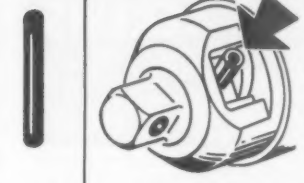
Solar Aircraft Company is now welding metal foil half as thick as a human hair into rigid structural panels for aircraft and missiles.

Solar-developed machines produce the precision honeycomb core—the heart of lightweight sandwich material. The core material may be brazed between two sheets of metal to form airframe structural panels or missile fuselages. It may also be used for applications such as a gas seal for turbine engines.

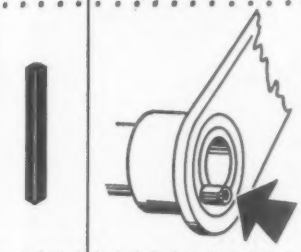
To make the core, metal ribbons from 3/32″ to 2″ wide and .001″ to .006″ thick are fed into a machine from spools. The metal passes through a cleaning solution, is wiped dry and enters

continued

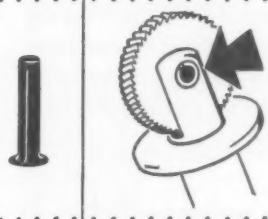
Rollpin® replaces 12 different fasteners



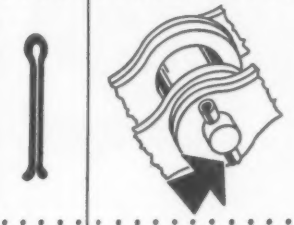
REPLACING A GROOVED PIN . . . in this application, Rollpin serves as a stop pin in a ratchet wrench adaptor. With its light weight and high shear strength, Rollpin functions perfectly . . . cuts assembly costs.



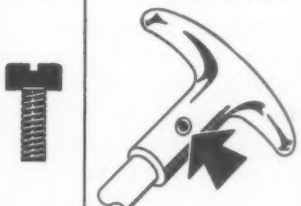
REPLACING A KEY . . . Rollpin demonstrates its ability to do away with precision tolerances, in this heating system damper arm. Faster, cheaper and more satisfactory than previous assemblies.



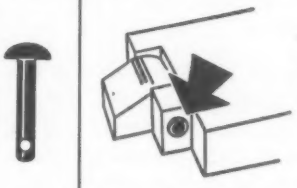
REPLACING A RIVET SHAFT . . . Rollpin serves as an axle for the sparkwheel of a cigarette lighter. No riveting or threading necessary . . . faster assembly. Note flush, clean fit.



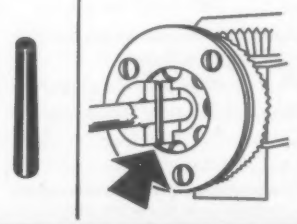
REPLACING A COTTER PIN . . . Rollpin assembly time is shorter, service life ten times longer. Vibration-proof flush fit. Easily removable.



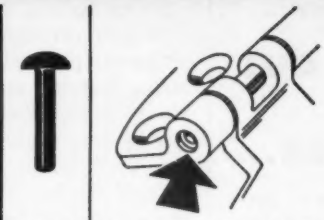
REPLACING A SET SCREW . . . to fasten automobile brake handle a short length Rollpin is self-retained in the hand grip but can easily be driven into over-drilled hole in shaft for simple handle removal.



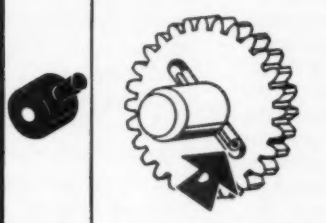
REPLACING A CLEVIS PIN . . . here Rollpin holds firmly in clevis, permits free action of moving member. Rollpin application shown is the plate of a home workshop tool.



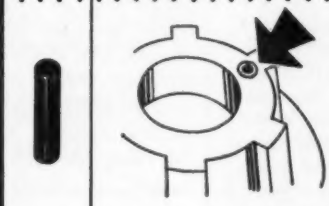
REPLACING TAPER PINS . . . in the assembly of precision differentials eliminated cost of taper pin reamers and the entire reaming operation. Rollpin costs less than a taper pin and installation is cheaper. They remove easily.



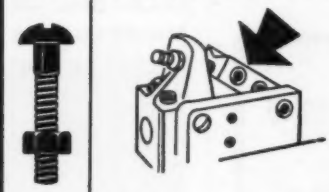
REPLACING A HEADED PIN . . . in this hinge pin application, Rollpin is simply and inexpensively driven in place, greatly reducing assembly costs. Constant spring tension holds Rollpin firmly in place . . . eliminates loosening of hinge due to wear.



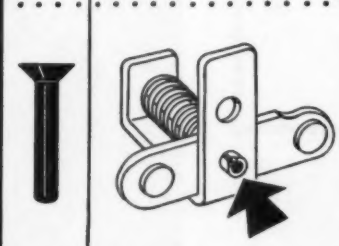
REPLACING A HUB ON A GEAR . . . Rollpin, self-retained in shaft, is simply snapped into molded slot to position sintered gear. This application, by an office equipment manufacturer, effects major savings in assembly. Rollpin's high shear strength is particularly valuable here.



REPLACING A DOWEL PIN . . . Rollpin is used here to prevent rotation of a thrust bearing. No reaming, no special locking. Easily removed. Lowest possible dowel pin cost.

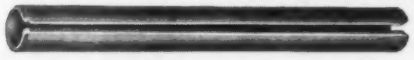


REPLACING A BOLT AND NUT . . . Rollpins act as fasteners and pivots for the linkages in this electric welder. Rollpins may be used with a free fit in outer or inner members depending upon product design requirements.



REPLACING A RIVET . . . Rollpin serves as guide shaft for spring-loaded electrical interlock contacts. This electrical equipment manufacturer reports that rivet failure previously occurred at the clinched end under normal operating impact and vibration.

WHERE CAN YOU USE THIS SIMPLE FASTENER?



Rollpin is the slotted tubular steel pin with chamfered ends that is cutting production and maintenance costs in every class of industry.

Drives easily into standard holes, compressing as driven. Spring action locks it in place—regardless of impact loading, stress reversals or severe vibration. Rollpin is readily removable and can be re-used in the same hole. Made in carbon steel, stainless steel and beryllium copper. Write for samples and information, ELASTIC STOP NUT CORPORATION OF AMERICA, 2330 Vauxhall Road, Dept. R47-1097, Union, New Jersey.

ROLLPIN TRADEMARK

ELASTIC STOP NUT CORPORATION OF AMERICA

2330 VAUXHALL ROAD, UNION, NEW JERSEY

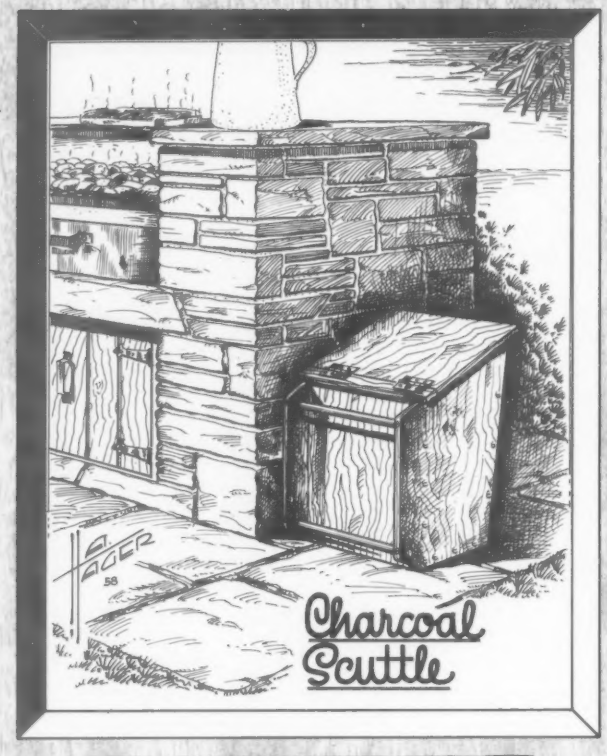
forming rollers. Formed from ribbon into corrugated pattern, the strips are pressed against adjacent strips forming strips of square or wave cells. From one to four needle-like welding heads move up and down the corrugated strips where the convolutions make contact, sending impulses of electrical current through to weld it. As many as 240 individual resistance welds are made each second. The machine will continue to add layer upon layer of honeycomb cells until the core has reached desired width.

Core is produced from a number of metals and alloys: 321 stainless, 17-7PH, Inconel, Inconel X, Inco 702, L-605, Haynes R-235, and A-286; for special programs, from other alloys and super alloys: all 200, 300, 400 series steels, AM-350, AM-355, 15-7Mo, 19-9DL, 19-9DX, Thermenol, titanium and zirconium.

SELF-LOCKING BOLTS CUT MAINTENANCE ON PRESSES

A chronic problem of maintaining tight fasteners on heavy presses subject to severe shocks and vibration has been solved by The Prosperity Company, of Syracuse, N.Y.

The company operates hydraulic presses of 500- and 1000-ton capacities in blanking, piercing, stretching and forming operations. It fabricates a wide variety of commercial laundry, dry cleaning and pressing equipment. Blanking and piercing of stainless steel

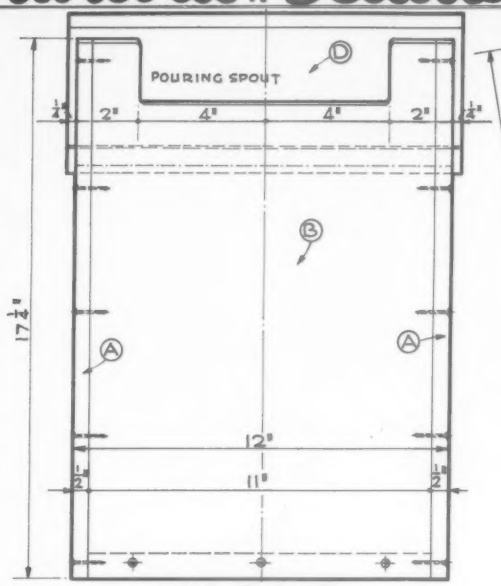


Hobby-neering with "ROCKFORD" Screw Products

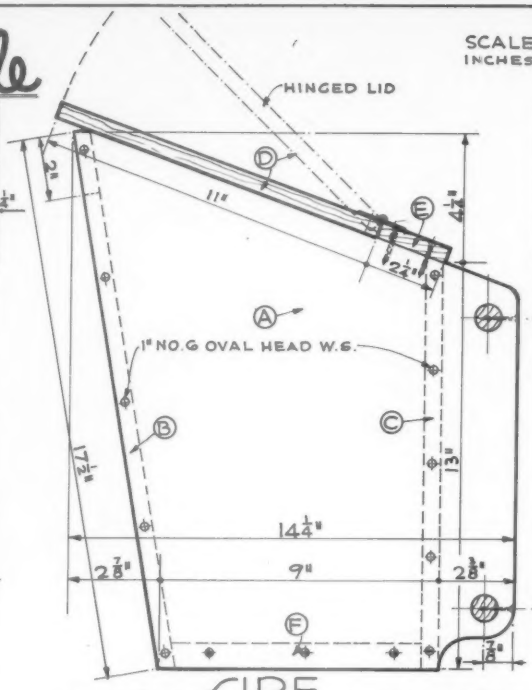
ORIGINAL DESIGNS

OCTOBER 1958

Charcoal.. Scuttle



FRONT



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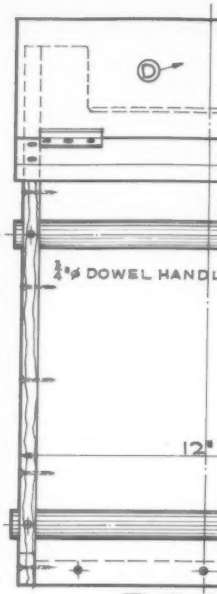
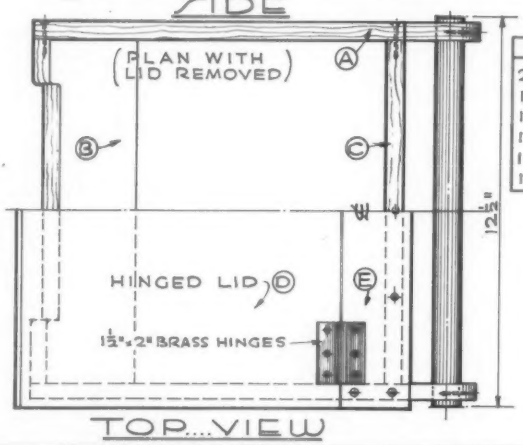


BAC

INFORMATION:

- INDOOR OR OUTDOOR CHARCOAL COOKING IS NOW A UNIVERSAL PASTIME. WHETHER YOU COOK ON A BEAUTIFUL PERMANENT OUTDOOR FIREPLACE OR SMALL PORTABLE GRILL, HANDLING CHARCOAL IN EITHER CASE IT'S MESSY. SO I TOO WELCOME THIS ITEM. IN DESIGNING THIS PROJECT FOR YOU I CONSIDERED CAPACITY CONVENIENCE & APPEARANCE.
- EASILY MADE OF ½" THICK LUMBER OR PLYWOOD, ASSEMBLE WITH *"ROCKFORD"* WOOD SCREWS AND PAINT OR ENAMEL IN GAY COLOR.
- IF YOU HAVEN'T BEEN BITTEN BY THE CHARCOAL COOKING BUG THEN MAKE ONE OF THESE SCUTTLES FOR A FRIEND, WHO HAS. SHOULD YOU BE PLANNING TO BUILD AN OUTDOOR FIREPLACE, LET ME SEND YOU MY FREE FOLDERS SHOWING 15 DESIGNS. Address me 3712 Halsted Road, Rockford, Ill.

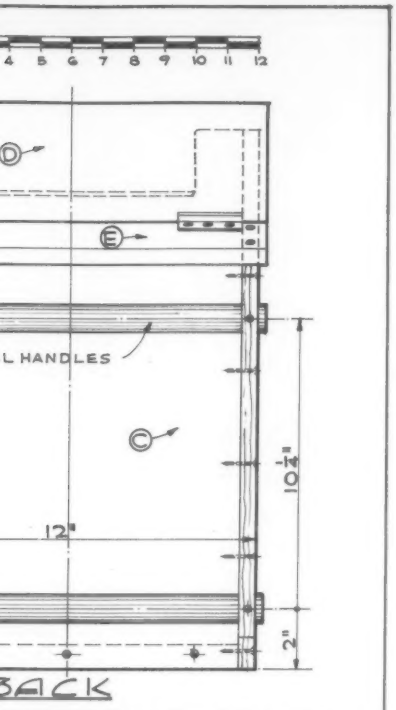
HERM.



TOP.... VIEW

BILL.. OF.. M

2 PCS.	½"	x 14¼"	x 17¼"
1 PC.	½"	x 11"	x 17½"
1 "	½"	x 11"	x 13"
1 "	½"	x 12½"	x 11"
1 "	½"	x 2½"	x 12½"
1 "	¾"	x 8½"	x 11"



OF.. MATERIALS

½" x 17¼" "A"	2 PCS. ¾" ø x 12½" DOWELS
" x 17½" "B"	1 PR. 1½" x 2" BR. HINGES
" x 13" "C"	"ROCKFORD" WOOD SCREWS
½" x 11" "D"	53 - 1" NO. 6 OVAL HEAD
¼" x 12½" "E"	
¼" x 11" "F"	

Hobby-neering®

SERIES.. NO. 8

PROJECT 10

Designed by C. EGER OF ROCKFORD

USE FOR COMMERCIAL PURPOSES IS STRICTLY FORBIDDEN

★ HERE THERE AND EVERYWHERE with "ROCKFORD" Screws and Bolts ★

JOHN DEERE
Self-propelled
hillside combine
in action

Manufactured by:
JOHN DEERE
Moline, Illinois

The above is an example of the great strides made in the AGRICULTURAL Equipment field, in providing the right equipment for every Farming operation.

Many "ROCKFORD" threaded fasteners are used in the above and other Farming Equipment. We Salute the Farm Equipment Industry.

"ROCKFORD" Screw Products Co.

GENERAL OFFICES AND PLANT NO. 1

PLANT NO. 2

PLANT NO. 3

Write for Latest Catalogs and Prices

"ROCKFORD" Quality - Controlled Threaded Fasteners Within Reach of Any INDUSTRY.

A Complete Line of Fasteners Fabricated in Our Three Modern Plants

up to ¼" thick and of boiler plate up to ½" thick caused frequent loosening of press bolts.

Weekend maintenance on the presses became accepted as routine. Two men with torque wrenches took three hours apiece every Saturday going over the presses to cinch down all fasteners.

However, since the installation of Unbrako self-locking bolts with nylon inserts at critical points on both presses, this maintenance has been reduced sharply.

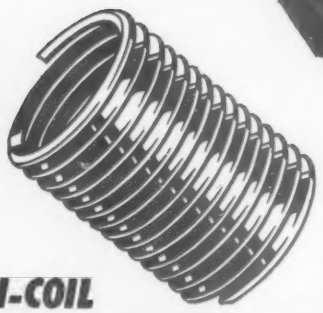
Philip H. McGuire, plant superintendent, reports that the maintenance crew now has to tighten fasteners on the 1000-ton press only every five months. This is a reduction of nearly 90 percent. On the older 500-ton press, tightening is necessary about once every four weeks. More frequent maintenance is necessary because threads in the tapped holes have stretched.

METAL STITCHING SPEEDS ASSEMBLY OF FREEZERS

Twelve times faster at one-third the material cost! That's what Amana Refrigeration Inc., of Amana, Iowa, reports after they started assembling aluminum freezer liners by stitching

It used to take 12 minutes a liner. Now the production rate with an Acme-Morrison stitcher is one a minute. By changing to metal stitching with No. 18 round wire, the same holding power was achieved as with the former method of fastening. Also, material costs were reduced to one-half the price of the fastening material used previously.

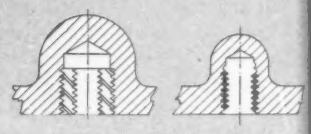
Here's
Use



HELI-COIL Stainless Steel Screw-THREAD Insert

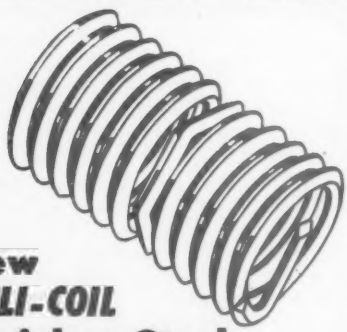
This is the insert that permanently protects threads against wear, stripping, corrosion, galling, seizing, vibration and shock. Made of (18-8) stainless steel wire, cold-rolled into a diamond shaped cross-section, this *Heli-Coil* Insert is work hardened to a tensile strength of approximately 200,000 psi . . . conforms to military standards MS 122076 through 122275 (ASG) and MS 124651 through 124850 (ASG) . . . conforms to standard commercial and industrial thread forms, including coarse, fine, pipe-thread and MM sizes . . . permits use of standard boss configurations.

Here Are



Save Space, Weight and Costs

Substantial savings in materials, weight, space and costs are possible, as against solid bushings, because smaller (or standard) bosses, flanges and threaded fasteners can be used.



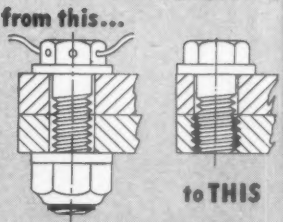
New HELI-COIL Stainless Steel Screw-LOCK Insert

Pat. Pending.

Conforming to military specifications for locking torque and vibration, this notable new *Heli-Coil* Screw-LOCK *one-piece* insert provides all the thread protection of the Screw-THREAD Insert, **PLUS** an exclusive internal locking feature that eliminates the need for clumsy protruding lock nuts, lock wiring and other supplementary locking devices . . . saves cost, space and weight . . . permits simplified streamlined design. The Insert is a permanently integrated part of the component—permits repeated service repair disassembly and reassembly, *with locking action remaining unimpaired.* Available in sizes from 4-40 up.

Here Are

from this...

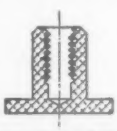


to THIS

Internal Locking Feature

Insures positive internal locking action—eliminates lock nuts, lock wiring and other protruding locking devices—saves space, weight, cost. Yet screw may be easily disassembled with no loss of locking torque.

➡ ***Heli-Coil* Field Engineers are at your service for**



CUSTOM LOCK NUTS

The *Heli-Coil* Screw-LOCK Insert is adaptable to special-shaped lock nuts, shells, spacers and fasteners and can be engineered to meet your torque or performance requirements. ***Heli-Coil Corporation*** is fully equipped to manufacture these special lock nuts to your specifications.

Note: Custom nuts, with Screw-LOCK Inserts, meet military specifications for lock nuts.

How Design Engineers use HELI-COIL* INSERTS to

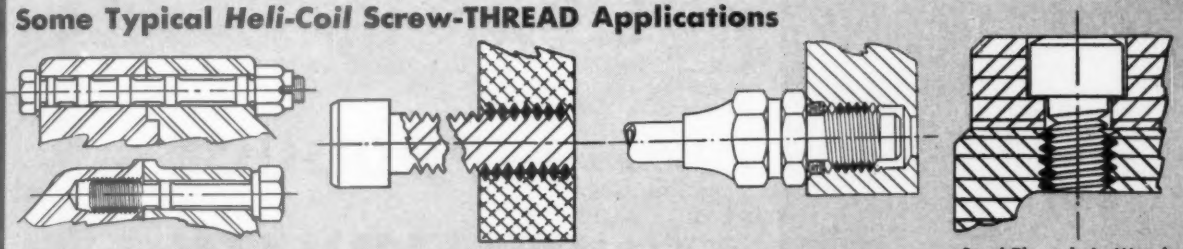
SAVE: SPACE—WEIGHT—COSTS

PERMANENTLY PROTECT THREADS AGAINST

ABUSE • WEAR • CORROSION • STRIPPING • GALLING • SEIZING • VIBRATION

Eliminate Lock Nuts — Lock Wiring — Lock Washers

Some Typical *Heli-Coil* Screw-THREAD Applications



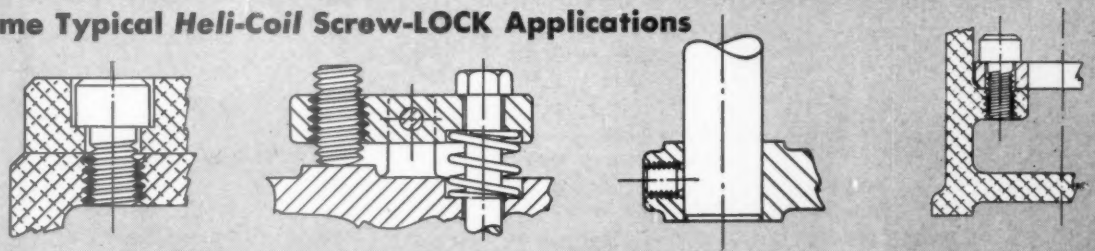
Compact Design
Improves design features by elimination of nuts, washers and extra-length bolts.

Stronger Thread Connections
Under excessive tension, torsion and impact loads in standard proportion bosses, the screw will break but the *Heli-Coil* Screw-THREAD Insert will remain undamaged . . . even in light alloy metal.

Leak-Proof Connections
In lightweight, high pressure hydraulic equipment, stainless steel inserts, regular and pipe thread, protect threaded pump and valve ports sealed with "O" rings.

Steel Threads in Wood, Plastics and Fiberglas
Provides permanent, strong, corrosion-resistant and wearproof threads in soft materials. Especially valuable where frequent assembly and disassembly is necessary.

Some Typical *Heli-Coil* Screw-LOCK Applications



Flush Nut Assemblies
Permits a securely locked, flush assembly, because its internal locking feature eliminates need for drilled head bolts and other protruding locking devices.

Lock Adjustment Screws
This simple design allows permanent, positive adjustment of screws in any position, secure against vibration or impact.

To Lock Set Screws
Positively locks assembly against loosening at desired adjustment — protects threads against stripping under high torque—permits use of light housing materials.

Inaccessible or Miniaturized Assemblies
Heli-Coil Screw-LOCK Insert permits installation of the locking feature from front or top. No blind fumbling for assembly of locking devices inside or behind.

design consultation — without obligation.

HELI-COIL CORPORATION

A Division of Topp Industries, Inc.

*Reg. U.S. Pat. Off.

HELI-COIL CORPORATION
3110 Shelter Rock Lane, Danbury, Conn.

Gentlemen: Please send me further information on

- ☐ *Heli-Coil* Screw-THREAD Inserts.
- ☐ *Heli-Coil* Screw-LOCK Inserts.
- ☐ *Heli-Coil* Custom Lock Nuts.
- ☐ Have a *Heli-Coil* Thread Engineer call—without obligation.

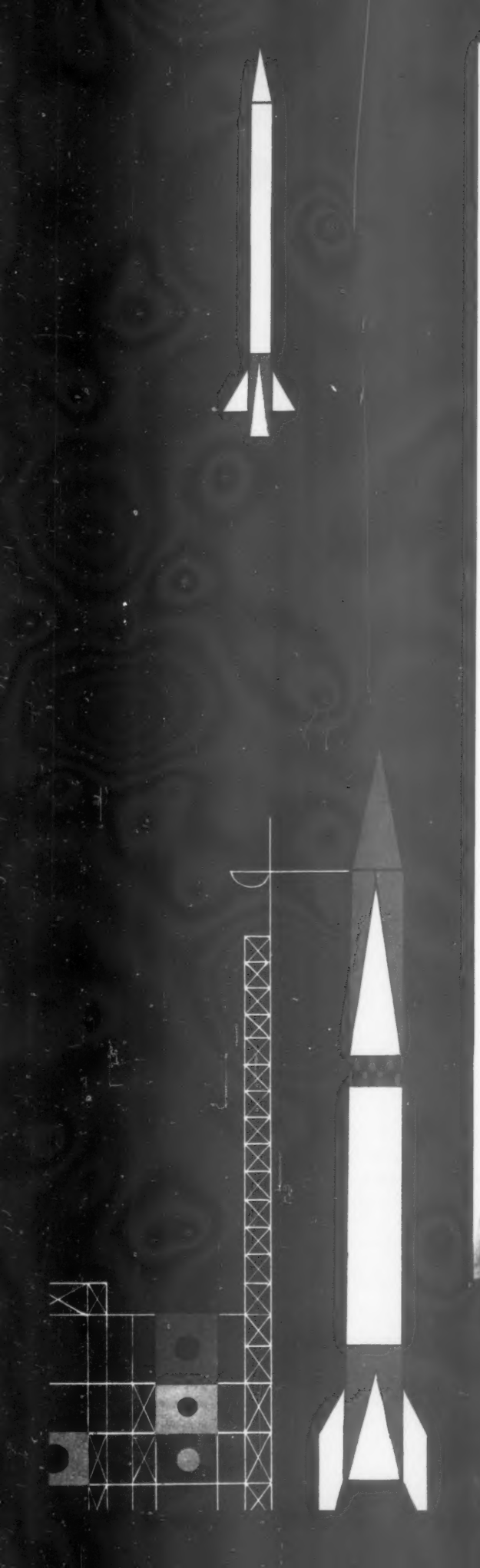
NAME_____ TITLE_____

FIRM_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

In Canada: W. R. WATKINS CO., Ltd., 41 Kipling Ave., S., Toronto 18, Ont.
Use postpaid card. Circle No. 228

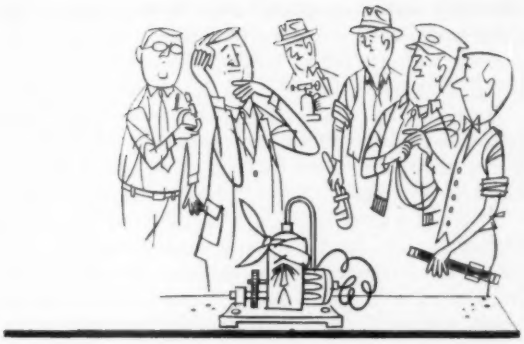


THE MISSILES-AGE HURLS A CHALLENGE AT US...

PRODUCT RELIABILITY

by **H. Thomas Hallowell, Jr.**
President
Standard Pressed Steel Co.

Why do rockets and missiles fail? Must we pay a yearly $16-billion repair and service bill? Are we meeting tomorrow's competition and needs with products doomed to failure even before they leave the line?



Not too long ago the electric window of my car . . . a beautiful new automobile . . . refused to roll up in a sleet storm. It provided less shelter than a $2 umbrella. The little button on the wonderful, newly-designed automatic windshield wiper and squirter on the same car is geared up so it automatically starts up when I don't need it. And most surprising of all, it won't windshield-squirt and wipe when I want it to. What's more, they haven't been able to fix it after several attempts and several service bills!

I don't have to continue my tales of woe, I know you can supply your own—many of them grimmer and more horrible than mine. But it's not unusual to have an electric appliance for three years and discover you've paid as much for service in three years as you paid for it originally. Everyone expects to return the new $3,000 automobile for service and "adjustments" many times before it is in the kind of running condition it should have been in when it came off the line. I recently learned that Detroit is perturbed over the scarcity of mechanics to service automobiles and are wondering what they are going to do about it. Could they design and manufacture a little more reliability into their products?

This business of product reliability is no laughing matter. The consumer is not amused when he pays $16-billion a year for service charges; neither are the manufacturers. The matter of product failure, or product inadequacy, has reached a point where some large appliance dealers will sell you a preventive maintenance contract—at extra charge—to "prevent trouble from happening," which is a tacit admission that product reliability is so poor that it is guaranteed to fail in service. These are serious problems for manufacturer and consumer.

The matter becomes even less humorous when you consider guided missiles. Take the case of the Atlas intercontinental missile, reputed to have 300,000 separate components. What must be the reliability of each of these parts—assuming all are vital to success—in order to put Atlas on target nine times out of ten? Well, each part has to have a reliability of 99.99996 per cent! Elsewhere in this article you'll find the mathematical proof of this; it is as staggering as it is serious.

continued

Industry is operating in an age when little things are becoming more and more important

You might well ask, what has caused this situation and what can be done about it?

First, the cause: I do not think that the manufacturers, whether of appliances, missiles, automobiles or what-have-you are intentionally producing inferior products. It is rather that some of them have not kept pace with modern thinking.

American industry today is operating in an entirely new atmosphere.

It is an age when things are continually moving faster, both physically and mentally; when numbers everywhere are growing larger; when, as things get bigger, the little things become more important.

There is a greatly increased tempo of technology—higher speeds, higher temperatures, higher stresses; there is rougher usage by the consumer—super highway travel at 70 mph instead of 40 mph a few years ago—all these things just naturally place a higher strain on products and make mistakes more and more costly. Things are becoming more complicated, and at a pace that accelerates, even as it aggravates.

And sometimes these little things, like fasteners, have not received the attention which the complex mechanisms of our missile-age require. For example: In one state alone 1200 automobile accidents were caused in one year by loose nuts and bolts. And yet additional expenditure of $5 per car would have ensured reliability and would have eliminated those accidents.

Another reason for product failure has been the unthinking drive to lower purchase price which has lessened the chances we have had in recent years for a general rise in the reliability of industrial goods. You can no longer afford to accept the inferior reliability standards of the lowest quality producer in an industry. Low quality usually accompanies low price. Using inferior purchased parts and raw materials is a most reliable way of building unreliability into your product. You know it's going to fail!

NO ONE IS SPARED . . . NO ONE IS SAFE

The mathematical handwriting is on the wall. With either decreasing components reliability or increasing number of parts, end-product reliability

The Arithmetic of Reliability

Over-all reliability, generally speaking, is the product of all the individual component reliabilities. To get the reliability of a typewriter, for example, you could multiply together the individual reliabilities of each critical part.

Here's a case where the whole is the product, and not the sum, of all the parts. It is the Law of Probability.

The mathematics of coin tossing provides perhaps the best analogy. Toss a coin once, and there is a fifty-fifty chance that "heads" will turn up. Heads has a 50% reliability.

But toss the coin twice and the chance of getting heads both times is no longer 50%. It is now 25%. That's because you have to multiply the probability of one independent event by that of the next to get the likelihood of their coming out the way you want. In the case of two tosses we have: 0.5 x 0.5 = 0.25. Similarly the chance of four consecutive heads is just little more than 6% (or .5 x .5 x .5 x .5 = .0625).

The law extends beyond two-sided things. Take the six-sided die of a dice game. Your chance of rolling any given side is one in six. The reliability of a "one" then is 16.7%. Try to roll "one" twice in a row and your chances drop to less than 3% (or 0.167 x 0.167 = 0.0279). Nowhere near as easy as flipping two heads, is it?

Nor is this probability mathematics limited to cases where all reliabilities are identical. Suppose you want first to toss a "head," then roll a "one." You could figure your chances (or your reliability) at one in twelve (1/2 x 1/6 = 1/12) or about 8%.

Product reliability problems can be handled in similar fashion. Just think of each toss as another component part. The chance of a "head" is now the chance of success, or the reliability, of an individual part. Over-all success of the product calls for all "heads."

The comparison brings home the fact, known by any competent coin tosser or dice roller, that the probability of success drops sharply with an increasing total of events (or parts). It helps, too, to have a high component reliability to begin with.

What Does this Mean to You?

A product or part that is 99 percent reliable is one that will do the job intended 99 time out of 100. In times past, this was generally considered to be a high degree of reliability—an exceptionally demanding one to meet. Even today, many components are produced with reliabilities of much less than this.

But take a product with only ten such "99%" components—each a critical part. Failure of any one of them would put the product out of action. What then is the over-all product reliability? No longer 99 percent. Now only 90.4 percent! Ten—not just one—out of every hundred will now fail to do their job. We get this simply by multiplying .99 by itself ten times.

This then is the mathematical problem of reliability—an acute one, made increasingly so by the effect of the built-in exponent.

The Inexorable Exponent

Since over-all reliability is the product of all the individual component reliabilities, we can express it mathematically as:

$R_{total} = r_1 \times r_2 \times r_3 \ldots r_n$

where "n" is the number of critical parts and the dots (. . .) indicate that all the reliabilities up through that for part "n" shall be included. When, for simplicity's sake, we assume that all the individual reliabilities are the same, or that an average reliability has been computed, this expression is further reduced in mathematical shorthand to:

$R_{total} = r^n$

where "n" —again referring to the total number of parts—is now in the position of the exponent. The exponent is merely a number that tells you how many times another number—in this case "r"—should be multiplied by itself. Thus 4^3 equals 64 or 4 x 4 x 4.

We call it the inexorable exponent because this kind of mathematics rather rapidly and ruthlessly reduces fractions or percentages to distressingly small numbers. Chance of failure increases "exponentially" (in short, it sky-rockets) with increasing numbers of parts. All the more deplorable since the trend is towards more and more of them.

Standards, Reliability and You

All of us as individuals are greatly indebted to the standardization work which has been done and is being done by all segments of our economy. I have intimately seen the benefits of these activities as President of the American Standards Association.

Today at lower business levels in all organizations, there exists the trained manpower of sufficient stature and experience to make greater strides in the development of American Standards than ever before. I encourage you and your companies to take an increasingly active part in standards work.

It is obviously an excellent investment, and much more economical, to build up a production unit using standard building blocks wherever possible. In this way you take maximum economic advantage of the blood, sweat, tears and collective experience which have been written into any standard.

As your customers are going to require more economical reliability and quality from your output, I suggest that you let the competitive facts of life be known to your suppliers.

Insist that you secure from your outside suppliers of raw materials, parts and components the standards in size, interchangeability, finish, quality and reliability you require.

You can no longer afford to accept the inferior reliability standards of the lowest-quality producer in an industry, which usually accompanies the lowest quoted price. Using inferior purchased parts and raw

material is a most reliable way of building unreliability into your product right from the start.

Start with the latest ideas in fastening methods and assembly equipment. Aim high in your objectives. You are looking for a times increase and not a percent increase in output. I repeat . . . aim high in your outlook on increased performance.

More than 90 percent of any given problem can be solved in this manner. For the missing segments take advantage of the latest ideas, procedures and advanced techniques with a confidence that in this way new products and new standards are developed.

Enlightened research today must be aimed at the solution of tomorrow's problems before they become acute. Leading manufacturers in every field have already at hand many answers for the unusual problem—they've been hard at work on the development of tomorrow's answers.

Go to them and accelerate the development of the new pilot plant setup into everyday performance, and performance for you—the man who dreamed up the new requirement so that your target of increased production can be hit!

For example, in the field of threaded fasteners today, for advanced applications we know that tensile strengths up to 300,000 psi are completely feasible. At the same time the fatigue strength of these products has gone up in proportion to the increase in tensile strength—an almost four times' increase over the garden variety fasteners we've grown up with.

Make your plans and progress by using multiplication—you can get there faster than by using simple addition. Forward-looking manufacturers in all fields today have worked out possible solutions for the advanced requirements. Take advantage of their research and facilities.

goes into a tail spin. Reliability is the concern of everyone and strikes many different industries and affects a multitude of situations. Let's review a few of them.

Competition: A bus, for instance, must make a run today in eight hours, tomorrow, in six. Yesterday it required a day to cover the same distance. Mechanical breakdowns cannot be tolerated. Busses must be reliable.

Safety: There are 50,000,000 cars on the road today. With certainly at least 100 critical joints in each they spell 5 billion sources of failure.

Productivity: Industry must squeeze more and more production from machines and equipment to meet the challenge of a declining work week, higher living standards and a declining work force. Machine part failure is intolerable. To the expense of downtime add the thousands of dollars of precision tooling that can be destroyed by just one shoulder screw loose in the jaws of a huge hydraulic press.

Automation: By the time you've automated you've spent so much capital the equipment just has to work. String 6, 12 or 20 machines together and you increase the complexity of the entire situation; using the mathematical formula of reliability you can readily understand how one tiny fastener can ruin thousands of dollars worth of tools, parts and controls.

Maintenance: It used to be that a good mechanic could do the job. But we added electrical features. And then pneumatic controls. And finally hydraulic and electronic elements, too—sometimes all on the same machine. It now takes as many as five experts to fix something—and a sixth to tell which experts to call in the first place. This costlier maintenance spurs the demand for reliability.

Atomic energy: Huge nuclear reactor vessels which must be dismantled periodically, are held together by as many as 60 large threaded studs. Imagine just one of these studs "seizing," as you take the reactor apart under 20 feet of water with remote control handling equipment. Things absolutely must have high reliability in the nuclear field.

Miniaturization: The irrepressible urge to do more with less. Miniaturization often is merely a cutting down of the factors of safety—the allowances for error. This leaves less room for the luxury of unknowns—or for unreliabilities—in either raw materials or component parts.

Servicing: This highlights a crying need for greater reliability. It may cost 10 times the initial purchase price to maintain military electronic equipment over its lifetime. It costs as much as $20 just to replace a screw on a service call. Contemplate, too, the consumers' $16-billion annual service and

continued

repair bill that is rapidly becoming a giant headache for the appliance industry, as well.

In short, reliability—or the High Reliability Factor, if you will—is not only a cornerstone to national defense, but a springboard as well to future consumer conveniences and to the technological advances leading to a higher standard of living.

It may be the key, too, to the future productivity or profitability of your business enterprise.

WHAT'S TO BE DONE

To state a problem, and point up its effect is one thing, to provide a solution is another. However, something can be done along these lines, and because reliability, while dealing with mechanical matters is basically controlled by human effort, our solution lies in the mental attitude and physical performance of all of us. Let us take a positive attitude!

First, we must think in terms of reliability. All members of the team must be educated to the problem. Until now we have operated in an environment that often dictates this false economy, "If you have trouble, so what; fix it." This outdated thinking must not apply in the missiles-age. It is a barrier to reliability.

Management must stop looking for a low initial purchase price of an item. Too often the lowest price has won out only to lose the battle in service, to the detriment of the manufacturer and the customer. The cost of the item must be measured in terms of final reliability. Management must learn to track down the cost of an apparent saving. Perhaps even the cost of inspection in a vast receiving department must be considered in the initial purchase price. Consider the down time, the cost of assembling, inspection, maintenance and replacement and it becomes painfully clear that our concept must be changed so that we think in terms of reliability and our mind must accept the truth that a slightly higher initial price is generally the lowest price in the final accounting.

The purchasing agent must now know the reliability formula, have knowledge of the specific

reliabilities involved in each assembly. Example: an additional finish grind, adding 1.3 cents to the price of a fastener, triples fatigue life of the part. This reliability gain must be appraised. Vendors will do well to justify the increased initial cost of their improved product performance in this way.

Assembly and production personnel must pay more attention to the individual components. Trend should be to more reliable assembling methods, to more economical processes as components are purchased with a view toward reliability and trouble- and cost-free assembling. Manufacturing must be vocal in its opinions regarding some of the so-called inexpensive components with which they are asked to work. Material, component and final product testing must become more intensive. Specimen tests must give way to actual product testing.

A major burden will be on the shoulders of the quality control fellows. A little quality improvement will go a long way. An increase in component reliability of less than one per cent in a hundred-part assembly will nearly triple over-all reliabiliity. Looking at it the other way: A one per cent slip in parts performance slashes end-product reliability by 64 per cent.

Designers must be called upon for more reliable designs. Design, together with the components that bring it to reality, is a critical factor in the reliability equation. A product can fail through functional unreliability, even though none of its component parts fail. Example: Early missile launchings went amiss when the liquid fuels sloshed around in the emptying tanks.

Product engineers must study carefully to see if they can best improve reliability by adding parts or by subtracting them. The job can be done either way. They will be weighing the weakness of the links against the weight of the chain.

And because things are becoming bigger and more complex, or are becoming smaller and still more complex the designer must pay more attention to details, the so-called "unimportant parts" like fasteners. In the age of reliability there are no "unimportant parts." What earthly sense is there in designing a truly new, magnificent washing machine, holding it together with the cheapest fasteners money can

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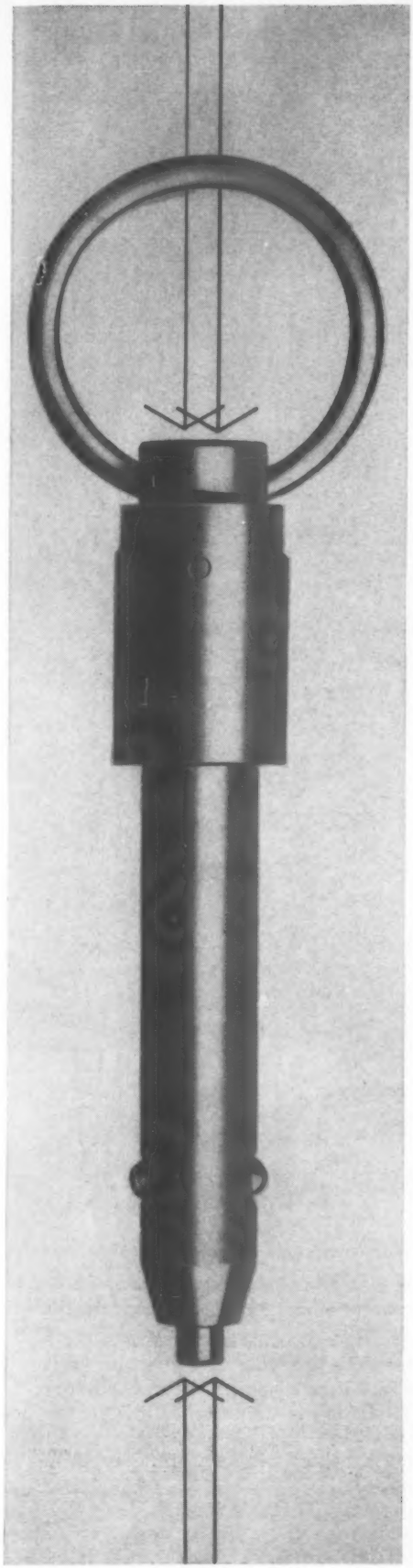

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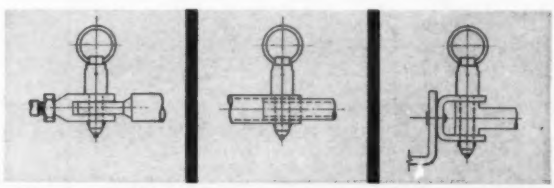

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buy, thus assuring yourself, and your company, in no uncertain terms that the vibration and rough usage the machine will be subjected to will cause it to fail before its time. Whether it's fasteners, housings, motors, cables, clips, connections, pins, bearings or enamel . . . there positively are no "unimportant parts" in this age of reliability. The inexorable exponent is busy here as in missiles and rockets. You can't beat it!

You will certainly want to take closer and more frequent looks at your supplier's operation. Is the supplier living the good life of reliability—not just on any given day, but every day?

There will be more of a movement to product qualification procedures—the industry-wide type of standards which are a key to increasing reliabilities in the aircraft field.

There will be an increasing trend to buy "brand" in the quest for high reliability. Less and less will the business go to the unproven, though lowest priced, low quality producer. Customers will find it of increasing value to seek out the proven performer, even if upon occasion he may sell at a slightly higher, though still competitive price.

Reliability—the probability of success—is not a new concept. The growing need for the accurate measure of product reliability is new, though. So too, is the increasing importance of higher and higher reliabilities—in machine tool, automobile and washing machine—in fact, in everything we buy and use.

The only way to beat the inexorable exponent is by increasing reliability, today, tomorrow, every day of the year! ●

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SOUND DESIGN HELPS CHECH

Though of lightweight construction and relatively inexpensive, Homelite chain saws are designed for durability despite the angular and torsional vibrations encountered in high-speed operation

by **Matt E. Heuertz,** *Managing Editor*

THE modern one-man chain saw, which has done so much to revolutionize the wood cutting industry, must fulfill certain requirements. It must be durable, lightweight and not too expensive. Above all, it must be reliable.

This reliability is taken for granted by a woodsman 25 miles out in the forest with a logging crew. He expects his chain saw to give dependable service eight hours a day for a minimum of five months. Then with possibly one overhaul, he expects it to last out the season. The occasional user, such as the farmer or tree surgeon, will expect his chain saw to last for several years with a minimum of repairs.

The rough use to which a chain saw is put in service places a heavy burden on fastening and assembly operations. The reputation of the manufacturer is dependent on how well his machine can operate despite continuous vibrations.

It was through emphasis on proper design and assembly techniques that the Homelite Division of Textron, Inc. became one of the top chain saw manufacturers in just nine years.

Homelite built their first gasoline-powered chain saw in 1949 at their headquarters plant in Port Chester, New York. Now, chain saw production is being consolidated at a new plant in Gastonia, North Carolina. Placed in operation just a year

CHARMFUL VIBRATIONS

Clarence Stevens, plant manager, holds magnesium housing used in Homelite's Zip chain saw held by Jim Mase, mfg. supt. Bill Tyminski (left), tool engr., designed setup for driving self-tapping studs in housing.

ago, the plant was designed for the assembly of chain saws under ideal production conditions. The main assembly area is almost completely conveyorized. Furthermore, the plant is air conditioned—a factor which contributes to good workmanship.

Since a chain saw nearly always operates at full throttle, it must be **durable** enough to withstand constant vibration in operation. The meanest vibrations encountered are angular and torsional. Angular vibration is transmitted to the engine from the extended saw as it cuts through a tree or log. Torsional vibration is transmitted from the clutch and crankshaft on through the housing.

Homelite engineers have devised various techniques to help minimize the effects of vibration, including balancing the crankshaft as statically as is feasible. This is inherently more difficult with single-cylinder chain saw engines than with multiple-cylinder machines.

For effective one-man operation, a chain saw must be **lightweight.** This means that where possible the engine housing and certain other components must be fabricated from magnesium or aluminum. Being also "soft" metals, there is the matter of assembling the parts so that the fasteners won't work loose.

Cost is the third big factor as chain saws have their own "built-in obsolescence." Usually it is not considered economical for the machines to undergo more than one overhaul.

continued

Let's now consider Homelite's new Zip chain saw which is being introduced for the first time this fall. Its selling price of approximately $170 makes it a highly competitive product. It weighs only 18 pounds without the guide bar, chain or fuel. The two-cycle, single-cylinder Zip has a maximum motor speed of 7500 rpm, and cuts at a chain speed of 3000 fpm. With these high speeds and the accompanying vibrations, the machine could easily shake apart in operation were it not properly constructed.

But in less than a decade, Homelite engineers have learned how to minimize the effects of vibration through constant research on new fastening techniques. This also has led to some surprising cost reductions.

USE SELF-TAPPING STUDS

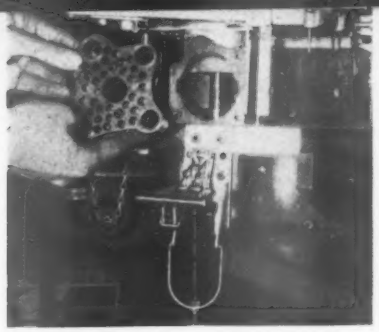
A dramatic example of this is concerned with self-tapping studs used for the first time by Homelite in the Zip saw. This application was worked out in conjunction with Pheoll fastener engineers.

Four of these studs are used to fasten the cylinder to the crankcase. The self-tapping studs provide for slightly deeper penetration of the magnesium housing than conventional studs. This provides a little more thread engagement to better withstand the tendency to loosen with vibration.

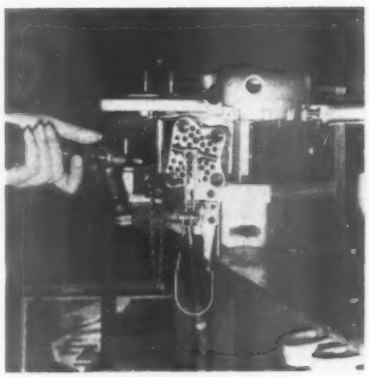
The cost reduction comes from the fact that the self-tapping studs eliminated a tapping operation on a spindle machine. This has resulted in a 32 percent saving in direct labor costs on this particular job. Moreover, the new studs have effected a surprising material saving. Over-all, the savings on both material and labor is 47.5 percent, with a splendid increase in product reliability.

A number of indirect savings also accrued. These include less handling of castings; freeing drill spindle for other tapping work; less wear on taps, which is considerable when working with "abrasive" magnesium; and elimination of operations for blowing chips out of tapped holes and inspecting the hole threads.

Here is how the studs are inserted in the crankcase housing which is supplied to Homelite as a casting with cored holes. First a steel guide plate is clamped in position to insure the studs are driven straight (as essentially a "tapping" operation is performed). The plate also provides a shoulder to prevent the air-gun from driving the studs beyond the



. . . Guide plate prevents gun from



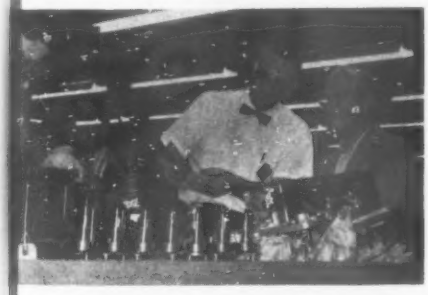
driving self-tapping studs beyond . . .

. . . correct depth and torque.

Overhead conveyor dips down at head of each major assembly line, delivering components for chain saw engines. Arbor press at head of each line is used to press-fit main bearing onto the crankshaft.

Wax holds these needle bearings in rod cap raceways during insertion of crankshaft.

Cylinder is slipped over piston and studs. Unit is then ready for final assembly line.



Clarence Stevens explains to editor Matt Heuertz how crankshaft is balanced to minimize vibration.

Swivel-type fixture permits workers to perform operations from the front or top.

desired depth and torque. The studs are driven one at a time with a tap gun which has a driver specially adapted to fit the chuck. Homelite expects to cut their direct labor costs even more here with the use of a four-spindle stud driver now under development.

Clarence Stevens, plant manager at Gastonia, reports that the self-tapping studs will probably be used in all models of their chain saws as the inventory of non-tapping studs is worked off. And here the proposed four-spindle stud driver will be a big aid as all models have the same stud hole pattern.

An extra benefit derived from the switch to the self-tapping studs is that the last three threads have a locking action. This provides a flanking interference so that the studs can't easily back out—not even when the nut is loosened for overhauling the motor.

STICK WAX AIDS ASSEMBLY

Homelite employs some other interesting techniques which help insure "tight" fasteners as well as facilitating operations on their four main assembly lines.

Component parts are delivered directly to the assembly area from the finished parts department via overhead Webb conveyor. This monorail passes through the sub-assembly areas and loops down at the head of the assembly lines. All four of the main lines perform the same type of operations in virtually the same sequence, even though different model saws are being assembled.

The first station on each line has a Famco arbor press. Here the main bearing of the engine is press-fitted onto the crankshaft which is then fitted to the housing.

Next the piston and rod assembly are bolted to the crankshaft. A ticklish job of inserting needle-like rollers into the raceways of the connecting rod cap was solved through the use of Johnson stick-wax. After the wax is rubbed on a group of rollers, half of them are slipped inside one raceway, and half in the mating raceway. The wax holds the rollers in position to permit inserting the crankshaft and bolting the raceways together.

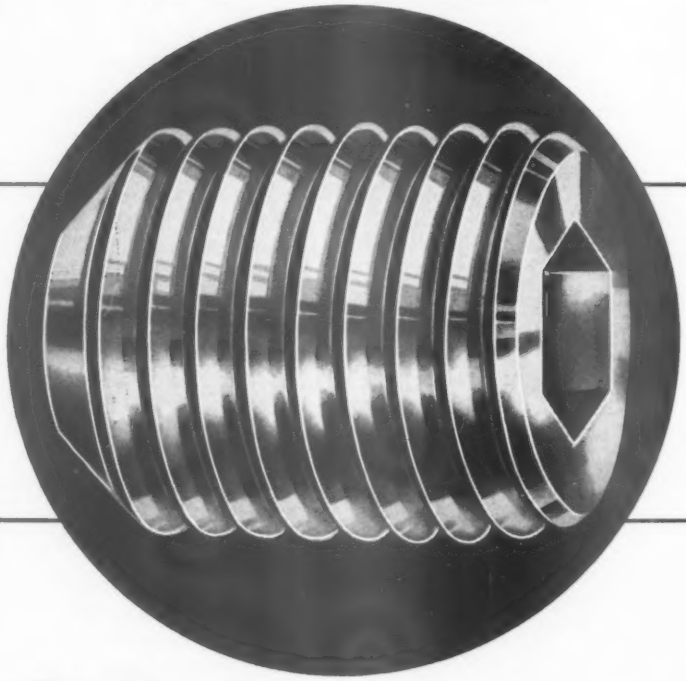
After the cylinder is slipped over the piston and studs in the crankcase, the nuts are fastened. Now the chain saw is ready for final assembly operations which are performed on a continuous slat-conveyor.

The main engine housing with the assembled piston, crank and drive shafts are placed in a Wilton holding fixtures on the waist-high conveyor. This fixture is designed so that the assembly can be swiveled 360 degrees in a horizontal plane and 180 degrees in a vertical plane. This eliminates any lifting of the unit, and enables the workers to perform all fastening operations from the front or top.

Experience has indicated the correct torque for each screw to withstand the tendency to work loose under vibration. And to assure positive control over the "fit" of all fasteners, individual power tools on the assembly lines are set for the correct torque for specific fasteners. Inspectors check the torque setting of each gun at regular intervals during the day. As an additional control over torque, random production samples are completely dis-assembled to check torque of all fasteners.

Naturally the deeper the penetration a fastener has the more holding power it has. But in places where only No. 6, No. 8 or No. 10 screws can be used, Homelite has found that a special thread-locking liquid plastic helps secure the screws. Called Loctite, this material hardens in the space between engaging threads. The sealant used by Homelite was specially compounded to set and harden in the short interval between final assembly and running tests which all engines must undergo before shipment. The sealant has also enabled Homelite to reduce tightening torque because of the bonding characteristic when hardened. This avoids any possibility of stripped threads due to overtightening in the magnesium and aluminum parts. ●

Problem: *"Secure pulley to shaft with set screw. Head of screw should be flush with pulley collar to prevent injury to personnel. Set screw must hold firmly under vibration. Space for tightening and loosening is limited . . ."*



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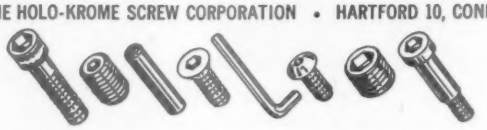

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by **A. M. Setapen**
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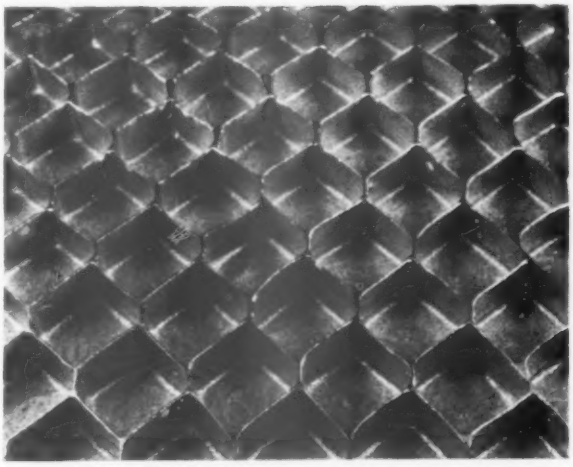
HIGH TEMPERATURE BRAZING

New filler metals, including silver and gold alloys, show great promise for high temperature service

THE increasing service temperature requirements imposed on brazed assemblies for rocket and jet engine parts, as well as for a growing variety of industrial equipment, has focused much attention on newer types of filler metals to make dependable joints in heat-resistant alloys on a production basis.



Cut-away of honeycomb section shows uniform filleting and excellent penetration into small gaps produced by a lithium-containing alloy.

Recent research performed at the Armour Research Foundation under the sponsorship of the Lithium Corporation of America has demonstrated that lithium makes an important contribution in filler metals for brazing heat resistant alloys. This research, now confirmed by industry experience, shows that the addition of a small percentage of lithium markedly improves the fluidity and wetting ability of many standard alloys. Thanks to the lithium modification, it is now possible to braze stainless steel in an atmosphere, without flux, at temperatures as low as 1600 F.

The lithium alloys typically contain 0.2 percent lithium. One such filler metal—sterling silver with lithium—is rapidly gaining favor for brazing honeycomb panels made of 17-7 PH stainless steel. Its flow temperature corresponds to the temperature for proper heat treatment of this metal. The joints retain a tensile strength of about 35,000-40,000 psi at 900 F (short-time test) which is the maximum service temperature for 17-7. Furthermore, the filler metal readily wets in vacuum, dry hydrogen, or inert gases, without flux.

Because of its high fluidity, this silver-copper-lithium filler is very advantageous for penetrating small gaps between the components of the brazed sandwich, and it represents a marked improvement over silver-manganese which does not easily wet 17-7 PH steel. Joints of sterling-lithium alloy are more corrosion resistant than those of silver-manganese. It is reported that the use of this lithium alloy in place of silver-manganese has reduced the

continued

Detail of diffuser-vane-and-shroud assembly made from 4130 molybdenum steel. Brazing alloy was AMS 4775 high-nickel alloy; furnace temperature was 2100 F.

reject rate on brazed honeycomb sections from 45-50 percent down to less than 10 percent. However, the high fluidity of the alloy has been found objectionable on large curved surfaces because of excessive run-off of the molten alloy. New developments are currently under test to overcome the problem. If successful, these developments should improve the process of brazing honeycomb panels and may reduce costs to the extent that brazed honeycomb will become a standard high-strength, lightweight structural material.

Other fillers in which the addition of small amounts of lithium has proved advantageous are the silver-copper eutectic, AMS 4772, and silver-manganese (85-15). These materials are being used for brazing stainless steel bellows, instrument assemblies, hydraulic lines and a variety of jet engine parts.

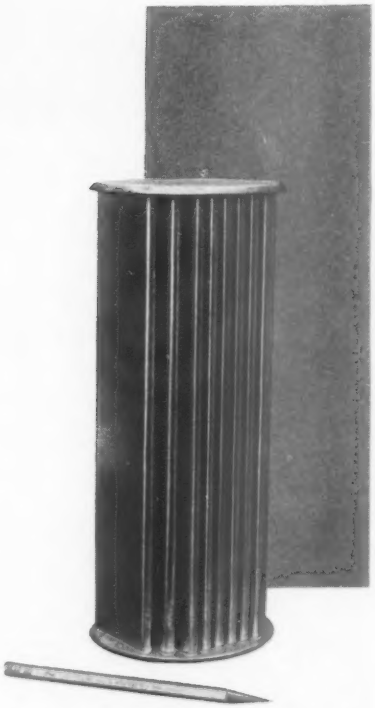
SILVER-LITHIUM BINARY

Another development is the silver-lithium binary, containing 2-3 percent lithium. This alloy has shown considerable promise for brazing titanium and its alloys. Peel strength is not yet satisfactory for some applications, but work is under way to improve this property.

Silver-palladium and silver-palladium-manganese alloys have been used to some extent in England and are of some experimental interest here. Palladium additions to silver increase the melting temperature, the strength, and the ability to wet iron- and nickel-base alloys. Manganese further improves the wetting. These alloys do not penetrate or dissolve the base metal to any extent. Joints of these alloys have been reported to be less susceptible to crevice corrosion attack than those made with silver-manganese alloys. Their resistance to oxidation is like that of other silver-base alloys.

MANGANESE-NICKEL

Manganese-nickel (70-30 percent) is being used very successfully for joining stainless steel, Inconel and other heat-resistant alloys. At elevated temperature it retains much of its high joint strength (55,000-65,000 psi at room temperature), and it offers better oxidation resistance than either silver-copper-lithium or silver-manganese. Its properties fall midway between the latter two fillers and the nickel-chromium-boron filler metals. That is, in oxidation resistance, it is better than the high-silver fillers, but not as good as the Ni-Cr-Si-B group. On the other hand, it has less tendency to dissolve or penetrate the base metal (highly undesirable with thin sections) than do the high-nickel alloys. Preliminary tests with manganese-nickel have yielded excellent results and the material is now being actively considered for brazing heat exchangers, rocket motor parts, clad metals, and turbine blades. It is currently available either in powder or in thin strip.



Heat exchanger of 316 stainless for high temperature service. It was brazed with a nickel-silicon-boron alloy at 1925 F in a 20-minute heating cycle.

Another group of alloys contains nickel as the main constiuent, with silicon and boron as the other alloying elements. In addition, in two of the alloys (including AMS 4775) part of the

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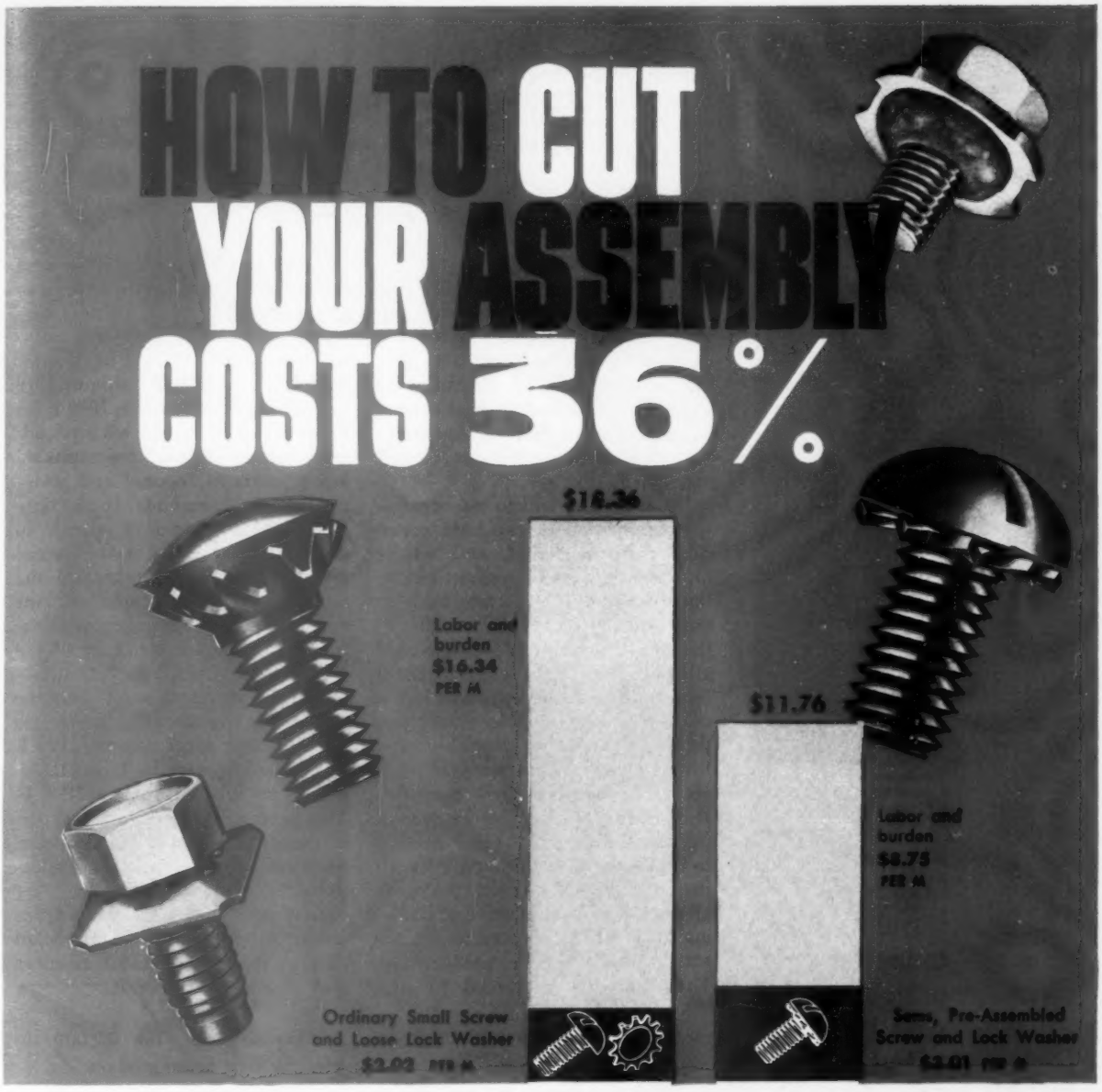
HOW TO CUT YOUR ASSEMBLY COSTS 36%



SEMS-by-SHAKEPROOF, mechanically pre-assembled washers and screws, eliminate separate washer handling on the production line . . . save you time and money. Here's proof:

The total cost of using separate washers and screws averages $18.36 per thousand, as the above chart shows. Switching to Sems reduces the labor and burden cost substantially, since hand assembly of washer and screw is eliminated. This brings down the total fastening cost to $11.76—a savings of 36%—even though pre-assembled Sems are priced slightly higher.

Even greater cost-savings result in the use of special Sems. Among the many types available are: high-strength Dished and Domed lock washer Sems; Countersunk lock washer Sems; fiber, asbestos or rubber washer Sems; Flat and Conical washer Sems; 3-piece terminal-clamp Sems; mastic sealing Sems; and a large variety of special washer and screw combinations.

Shakeproof recently concluded an analysis of fastening applications showing that the price of common fasteners is only 19% of the total cost, while labor and burden required to "install" the fasteners represent 81% of the total cost. This study proves that greater savings can be made with labor-saving fasteners than with fasteners purchased on the basis of lowest price per thousand.

To learn more about this concept of assembly savings, write for the Shakeproof "Price-Per-Thousand" booklet.

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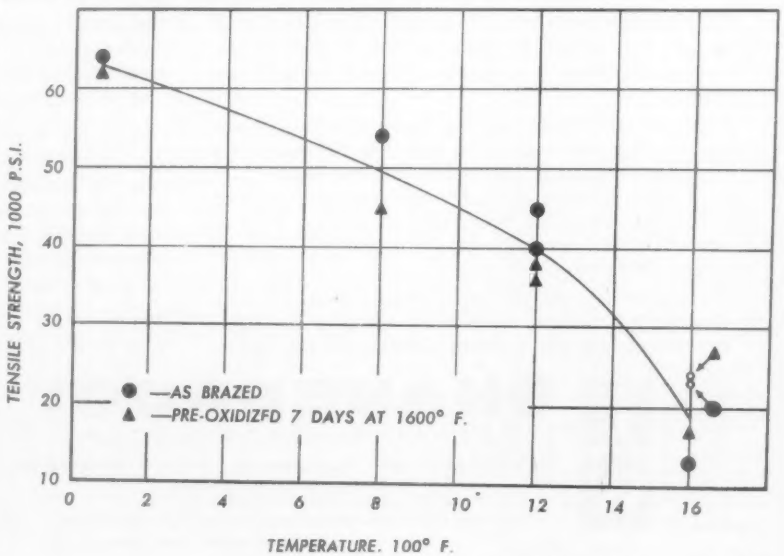
nickel is replaced with chromium to provide superior oxidation and corrosion resistance. In hardness and strength retention in the 1600-1800 F range, these high-nickel materials are unsurpassed. However, they do attack many base metals by intergranular penetration and solution.

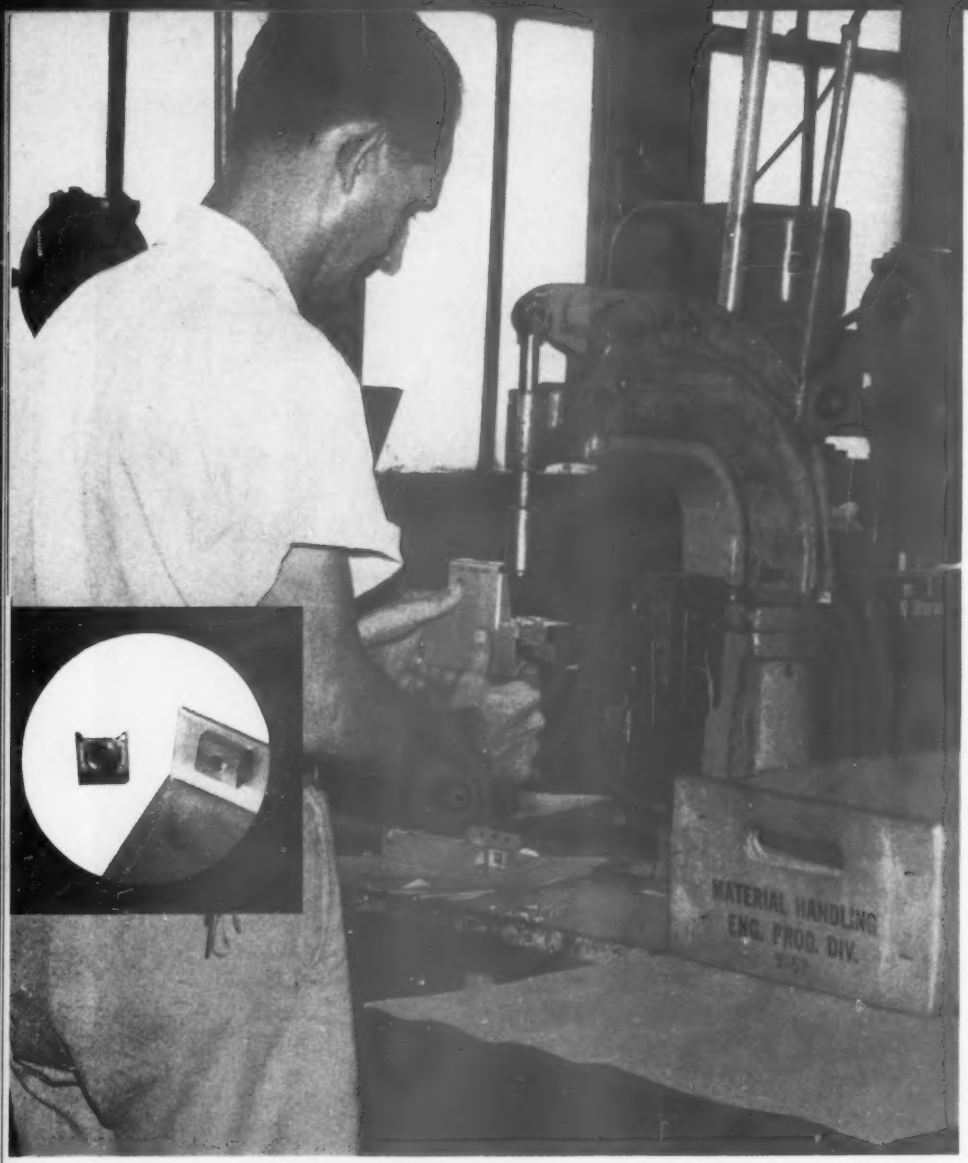
Typical applications for this group include: a vane-and-shroud assembly of 4130 chrome-molybdenum steel brazed at 2100 F; a nozzle assembly of Hastelloy-25 and type 304 stainless steel brazed at 2150 F; and a flat, tubular stainless steel heat exchanger brazed at 1925 F.

In situations where intergranular penetration of the base metal cannot be tolerated, and where high strength and excellent oxidation resistance are required at temperatures around 1600 F, there is a strong interest in gold alloys. The high gold content makes these alloys expensive on a per-ounce basis, but in most cases the value of the assembly and the extreme importance of reliable high-temperature performance outweigh, by far, the cost of the small amount of alloy needed to make the joint. Compared with the high-nickel alloys, the gold alloys have lower hardness, better ductility and less tendency toward intergranular penetration. They can be produced in any variety of wrought forms, in contrast to nickel-boron-silicon alloys which are available only in powder, sintered powder, or cast forms. In addition they have excellent wetting and flow characteristics.

Here are a few examples that account for some of the current interest in the performance of gold-nickel-chromium fillers. Lap joints between Inconel and stainless steel—brazed in a helium atmosphere at 1900 F without flux—were exposed to air at 1600 F for a period of 88 hours with no adverse effect. Photomicographs of other joints in Inconel and stainless steel assemblies show only slight grain boundary attack in the stainless steel, but the extent was negligible considering the long brazing cycle employed. Nor was there any intergranular penetration in the Inconel part of the assembly. Still other joints—brazed in stainless steel with the gold-chromium-nickel filler and heated in air for 7 days at 1600 F—retained a tensile strength of 20,000 psi when tested at 1600 F. This is considered excellent performance at this temperature. Some of the advanced applications for which these gold filler metals are being considered include components for rocket motors, missiles, nuclear reactors and supersonic aircraft. ●

Strength of gold-chrome-nickel joints in stainless steel. The 20,000 psi strength at 1600 F is well over that provided by most brazing alloys.





This nut has tapered corner pro tions and a hub-like hole pro tion.

It is ring-staked in place, squ ing the sheet metal tight aro the hub.

When the cost of failure is greater than the cost of . . .

A FAIL-PROOF ASSEMBLY

WHEN a manufacturer rejects conventional fastening devices and pays as much as 20¢ each for a particular fastener in small quantity when normal production of the item results in a user cost of less than 5¢ for popular sizes, there must be some merit in the unusual fastener and a realization that the cost of failure is far greater than the apparent high cost of an item to assure reliability.

The company referred to is the Radio Corporation of America. The fastener is RCA's Quintlock nut. It all goes back to the basic question of reliability in defense production. In addition to the many popular consumer goods made by RCA for the retail trade, numerous vital assemblies for industry and the military are de-

Necessity of fail-proof assembly in defense equipment led RCA to design a more expensive nut with five gripping points

by **Darrell Ward,** *Field Editor*

signed and produced under the requirement of maximum reliability. These range from tiny transistors to complex missile guidance systems.

During World War II, RCA was a consumer of gargantuan quantities of many different fasteners. For instance, one special stop nut was used by the millions. Some large chassis would have 100 or more such fasteners. But it was found that under the torque of high powered assembly tools these staked-in nuts could come loose.

Production people in some operations, without supervisory approval, resorted to tapping the hole ahead of the screw. This made assembly easier without developing sufficient torque to break screws or make the nut shear loose. But it killed the very benefit provided by this stop nut. The binding quality which prevented the screw from working loose was eliminated when the hole was tapped.

Many problems of this kind occurred over a period of time. In certain applications there was a specific need for a foolproof fastener that would hold beyond the fatigue point of the screw. A fastener was needed which could not shear loose from the chassis when full torque was applied to set the screw.

This basic problem was the incentive which inspired the invention of the Quintlock nut by S. H. Watson, who at that time was a project engineer. Today, Mr. Watson is Manager of RCA's Corporate Standardizing Division in Camden, N.J.

The Quintlock design, as its name would indicate, locks the nut to the chassis at five point of gripping contact. Its function is rather like an ordinary square nut, but with four tapered point corner projections and a hub-like projection around the threaded hole.

In installation, a hole is punched or drilled in the sheet metal part to make metal-to-metal contact, or with very slight allowance for the hub. According to the thickness of the sheet metal, the hub may be set flush with the opposite face or slightly recessed. Ring-staking presses the nut in place, squeezes the metal tight around the hub, and makes the tapered points penetrate the metal and deflect outward.

Once the Quintlock nut is pressed into place on material such as aluminum or brass, the junction of metal is almost a "cold weld" while the spread corner-points resist torque applied to the screw. In every test of standard types and sizes of screws being secured by the nut, the screw would break or shear before the nut could be moved.

Two basic Quintlock designs are distinguished by the shape of the hub. The push-in type has a straight hub. The ring-staked type has a reverse taper which when seated appears to have been inserted from the opposite side in a countersunk hole formed by metal displaced by the staking operation. Thus, the nut cannot be pushed or twisted out of the hole even if the four corners would not resist torque, unless deliberately driven out.

The Quintlock design gained wide acceptance rapidly during the war. It eventually became a load balancing factor for screw machines which could easily produce this fastener between other defense jobs. The fastener is seldom made by RCA now. However, RCA has made the fastener available to the trade by granting licenses under U. S. Patent 2,486,769 to other manufacturers.

Obviously, the Quintlock nut is more expensive than a self-tapping screw or an extruded and tapped hole. But this fastener avoids the danger of stripping threads in a soft metal chassis. Such an accident could result in considerable rework or complete rejection of the part at the factory, or else offer probable danger of failure in the field. Being flush mounted with the face of a chassis, the nut provides an additional feature without the additional operation of counterboring.

Its biggest application has been in aluminum chassis where it assures freedom from faulty assembly, and provides for positive locking of screws for heavy duty service.

The manufacturing cost in large volume for a 6-32 Quintlock nut on a 5-spindle automatic screw machine during the war was less than one cent. In today's market, they are estimated at less than 2¢ each, depending on size of run and local market conditions.

On this basis, an average selling price to a volume user would be less than 5¢ each, but RCA has paid as much as 20¢ each at a time when it was necessary to procure small quantities for prototype construction. But even at this high cost, the fail-proof characteristics in assembly and in the field far outweighed the sacrifice of substitute components or the higher cost of completely redesigning a whole assembly.

Naturally, the Quintlock nut cannot compete price-wise with weld nuts or self-tapping screws where these fasteners are applicable. But, as illustrated on the relay chassis during our visit, there are many assemblies which do not allow clearance for welder electrodes. Moreover, thin metal such as sheet aluminum would not provide enough self-tapping screw thread engagement to withstand the high torque of assembly or the shock and vibration often encountered in service.

Reliability of the product in service is the primary factor, besides freedom from assembly problems. Other fasteners have been tried, but only

continued

those with certain undesirable features were capable of making a fail-proof assembly.

Some fasteners offer benefits similar to the Quintlock nut, but some of these require counterboring for flush mounting. Others require greater clearance than might be allowed in small units. Some cannot withstand the assembly and disassembly of the mating screw many times before they lose their torque resisting features.

Mr. Watson points out that RCA has not vigorously promoted the sale of Quintlock nuts. Their primary interest is the application of the fasteners as a reliability feature in RCA products. They firmly believe that the cost of failure is too high a price to pay for compromise on the production line. •

SET SCREWS HELP CUT APPLIANCE MAINTENANCE

Special self-locking set screws (see arrows) are now used by the Whirlpool Corporation to fasten motor pulleys, brake pulleys and transmission pulleys on their automatic washers and dryers.

The set screws, manufactured by Nylok, have a small plug of nylon embedded in the threaded area of the fastener to hold the screw from slipping out of adjustment under heavy vibration and impact.

Whirlpool decided on the set screw after a test which simulated 10 years of washer life. After running a total of 1,752 hours, it was found that the set screws held firm. Two of the machines used in the test had the screws removed every 500 hours and reinstalled, simulating a repair job and proving screw reusability.

See how Du Pont Rivets answer 4 basic product design requirements

Aluminum roof is fastened from the top to carousel at Rockaways' Playland, N. Y.—with Du Pont Rivets.

1. WORKABILITY: You can rivet hard-to-reach parts of your product easily and quickly with Du Pont Industrial Blind Expansion Rivets, for greater freedom in design. Merely apply a heated riveting iron to the head of each rivet for as little as ½ second and a small chemical charge expands the rivet shank to lock the rivet in place.

Du Pont Rivets give neat, "finished" look to over 100 doors at Philadelphia's International Airport.

2. NEAT APPEARANCE: Du Pont Blind Rivets *add* to the neat appearance of your product. Smooth, solid heads blend with the metal—and need no after-finishing, buffing, trimming, or cutting. You can get Du Pont Rivets with modified brazier or 100° countersunk heads—made from aluminum, brass, nickel-plated brass, and nickel.

Cal Det Products of Calif. uses Du Pont Rivets for efficient, easy manufacture of this rotisserie.

3. LOW COST ASSEMBLY: This *quick* fastening method can cut your assembly costs. Operation is simple: Just drill holes, insert rivets, and expand them. You lower your rivet inventory too—a single Du Pont Rivet accommodates varying metal thicknesses. Available in diameters of ⅛", 5⁄32", 3⁄16", and ¼".

Brunswick-Balke-Collender increases chair production 25.6% with Du Pont Rivets—and one less man on line.

4. PRODUCTION SPEED: One man can easily set 20 to 25 Du Pont Rivets per minute. You don't have to "buck."

SEND FOR 12-PAGE BULLETIN . . . tells how to reduce production costs, improve appearance, solve unusual fastening problems.

Explosives Department, E. I. du Pont de Nemours & Co. (Inc.), 2543 Nemours Bldg., Wilmington 98, Delaware.

Send Du Pont Rivet "Ideas and Suggestions" bulletin.

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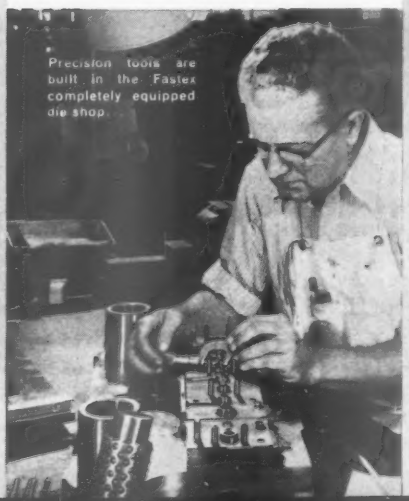
Include a description of its use, quantity requirements. We will forward a firm quotation to you quickly.



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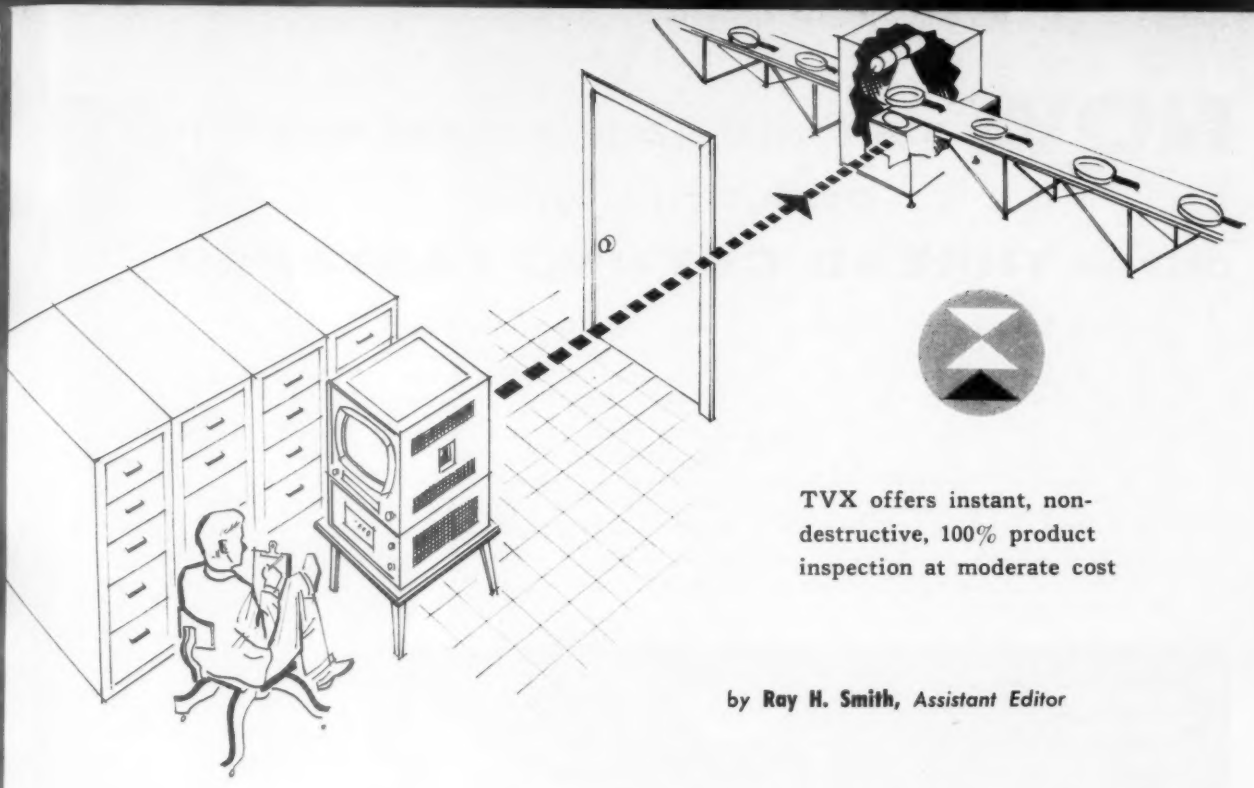


TVX offers instant, non-destructive, 100% product inspection at moderate cost

by **Ray H. Smith,** *Assistant Editor*

ASSEMBLY INSPECTION BY TV X-RAY

Inspector views the heating element terminals and thermostat assembly of an electric frypan on TV monitor. In this instance, monitor unit rests on top of control unit to conserve space.

NOW you can look into the heart of your finished product and instantly tell if it is properly assembled.

Right on the assembly line you can spot missing or faulty fasteners, see misaligned rivets, inspect the quality of weldments, brazes, solders, and so forth, without interrupting production flow or damaging the product.

Gone is the long delay of waiting for a finished x-ray print under radiography. Television x-ray offers instantaneous, convenient, 100% product inspection.

This major breakthrough in automated quality control was accomplished in Milwaukee, Wis., by the X-Ray Department of General Electric, which disclosed that four corporations and the Atomic Energy Commission are already using G-E production models successfully.

Called TVX, the new system is designed for installation on assembly lines and permits viewing on a television-like screen up to 1400 feet distance from the camera. The hook-up is comparable to standard closed-circuit TV, allowing the addition of extra monitors, or any ordinary TV receiver, for simultaneous observation from separate locations.

A significant improvement over conventional fluoroscopic inspection, which requires viewing in a darkened room and then for only relatively short periods of time, TVX projects a 10,000-times brighter image, necessary for visibility in normally lighted areas. It also increases penetrability (sensitivity) from fourfold upwards. By reducing x-

continued

NOW standard hand socket wrench or nut-runner drives THREAD CUTTING FASTENER

Specifically designed to hold die-cast or cold-forged name plates, emblems and trim against sheet metal surfaces . . . DOT's hex-head T.C.F. can be used in many other applications which require a spring take-up fastener (with integral washer) that pulls up tight without backup on flat or contoured surfaces.

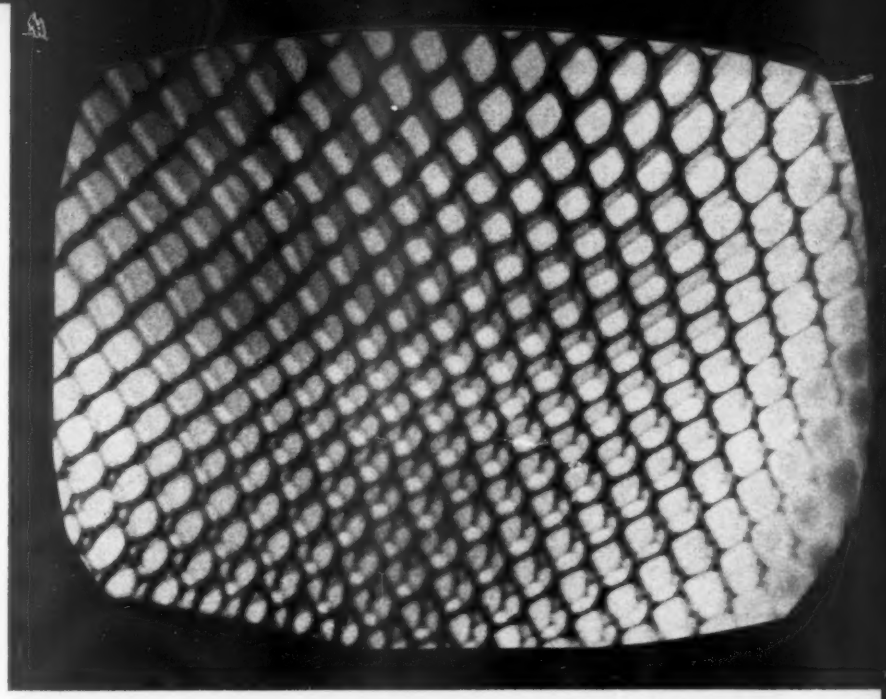
It cuts clean, deep threads on unthreaded studs, even those that are chrome plated. Used on non-vertical studs, T.C.F. accomodates itself to any angle up to 20° from the vertical . . . and, when supplied with a pre-assembled plastic sealer, makes a water-tight seal. The sealer *precedes* the fastener onto the stud so that it is not damaged by the thread-cutting process.

T.C.F. is available *in quantity*, with or without sealer, to fit 1/8", 3/16" and 1/4" studs. Detailed drawings, dimensions and prices available on request.

Use postpaid card. Circle No. 240

ray energy requirements, TVX leads to more economical and reliable operation.

The system consists of three basic units which sell for approximately $7500: the x-ray sensitive camera, the control unit and the viewing monitor. The x-ray generator, whose kilovolt (KVP) output determines the degree of sensitivity obtainable, and materials handling or positioning equipment are provided by the user. Any standard x-ray generator is adequate, but new machines cost as little as $1000 for a 90 kilovolt model. KVP output from the smallest generator will pierce light fillings (golf balls, etc.) and thin aluminum, while 1000 KVPs, more than adequate for most uses, penetrates 6"-7" steel castings.



A four-inch section of brazed honeycomb structure magnified on 12-inch screen. Laminations of thin layers of stainless steel are bonded to honeycomb spacers.

MAGNIFY PICTURE

The camera target (pickup field) of 6⅞ diameter, when transmitted to the monitor, can be electronically magnified three times or reduced one-half, without greatly affecting sensitivity, by simple manipulation of dials located on front panels of the control and monitor units. In assembly line operation, maximum conveyor speed without causing a blurred image would be 10 feet per minute. Correct camera positioning is all-important for efficient inspection; angle can be adjusted whenever desired.

WHAT WILL TVX REVEAL?

And just what will TVX's camera reveal? G-E engineers say that anything (i.e. object, substance, void) with a difference in density from surrounding material will stand out. In weldments, for example, this would include slag, gas, other inclusions. In riveting, large bright shadows would appear where holes are too large for the rivet body; misalignment would be clear. The system uncovers faulty assembly of all types, such as broken leads in terminals and incorrect castings of calrods which West Bend (Wis.) Aluminum has been fereting out for two years with TVX. Fasteners missing at critical points can also be watched for.

Throughout the nation, industry is taking advantage of G-E's offer of a 30-day free trial with an option to buy if TVX is suited to their needs. The Argonne National Laboratory in Lemont, Ill., is examining fuel elements on reactors, Barkley & Dexter of Boston, Mass., is looking for defects in potted components and Curtis-Wright Aircraft of Woodridge, N.J., is set up for inspecting the quality of rubber boots inserted in propellers, as well as welds. Several manufacturers of honeycomb core for structural panels are making tests and the Allegheny Ballistics Laboratory is also experimenting.

Protection from x-radiation is provided not only by remote viewing but also by housing the camera and inspecting section of the conveyor in an x-ray cabinet. This allows the safe use of any x-ray intensity necessary for adequate penetration up to the limit of the associated x-ray generator.

Operation of TVX quickly becomes a matter of routine, assure G-E engineers, who claim that one industry-trained technician can handle any system. General Electric representatives spend an entire day demonstra-

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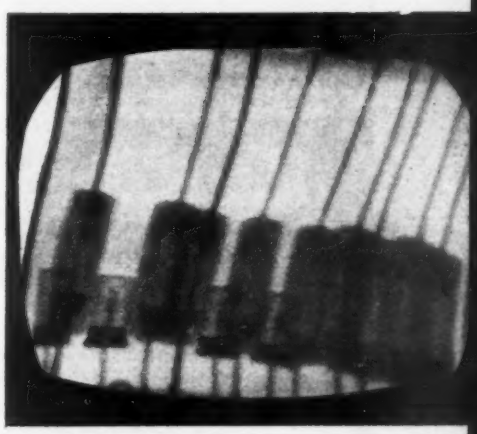
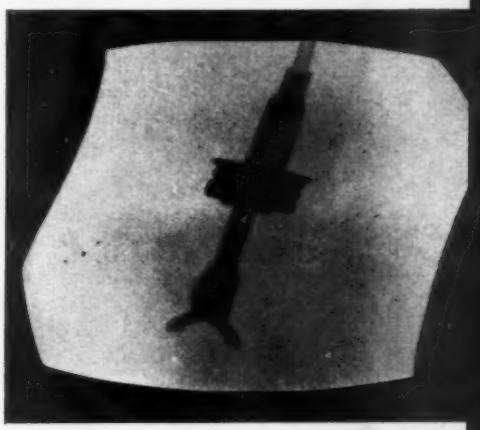


Magnified x-ray image of 2" x 2" area of a "potted" (foam plastic encased) electronic component.



The spring, ball, plunger assembly of a plastic atomizer spray nozzle seen in plastic-metal product.

ting TVX for the company-appointed technicians; servicing is always available.

In the final analysis the human element—the ability of inspectors to recognize and react to what they are looking for—determines the system's effectiveness for an individual company. Interestingly, G-E officials point out that experience has shown them that women between the ages of 18 and 20 develop highest proficiency as viewers.

PERMANENT RECORD

TVX is designed to complement, not replace, radiography—the recording of x-ray images on film or plate. Each technique has its distinct value for industry. Fluoroscopy, however, eliminates the time lag between x-ray impression and viewing, which is still a minimum of one minute through dry-processing of plates (xeroradiography). The minimum interval is six minutes for viewing wet film with G-E's new LX-140 portable unit, and longer on more powerful models. Remember though that just a few years ago the waiting period for developing was 20-45 minutes, now the time required for a finished print.

For users who do need permanent records of inspected products, TVX remains feasible. Push-button motion pictures can be taken of a monitor image (sineo-video radiography) or single exposures can be made on plate or film through normal radiographic procedure by stopping the conveyor for an instant.

CAMERA TUBE

The new TVX pickup tube, heart of the 20-pound camera, is credited by General Electric as the key to the success of their system. This tube allows direct transfer of x-ray energy to electron energy capable of being displayed on a TV monitor. It eliminates the three energy conversions still necessary in conventional fluoroscopy which are extremely noisy, time consuming and expensive. Tube replacement is the major recurring expense

Photograph of image of burned out, opaque-glass photo-flood type bulb on monitor. Degree of magnification possible is emphasized by easy view of fine filament wire support of bulb, which is actually only 3" in diameter.

($700 and up). While the tube in a typical 175 KVP model (3% sensitivity on 1" aluminum) is warranteed for 1000 hours or 10,000 exposures, actual life is often over 10,000 hours.

The control unit consists of five subchassis contained in a metal cabinet equipped with ventilating screens and weighs 66 pounds. The subchassis is comprised of rectifier, regulator, video, sync and blanking. Each is easily removable for servicing. A blower circulates air to protect components from over-heating. Easy-to-set controls are provided for "gain," "target voltage" and "on-off." Installation and service controls are also provided for "focus," "beam current," "size balance," 'horizontal centering," "vertical size" and "centering."

The 88-pound viewing monitor has a 12-inch picture tube plus chassis with circuitry to translate the electrical image into a visual image and to provide high voltage for the picture tube.

Simple, front mounted controls are provided for "brightness," "contrast" and "focus." Installation and service controls are provided for "horizontal drive," "size," "centering," "frequency," "vertical hold" and "linearity." Horizontal resolution of the TVX monitor is 46 lines per inch (min.) at center of picture tube. Vertical resolution is 37 lines per inch at center of tube. •

AC Spark Plug reduces downtime considerably with . . .

STATIC CONTROLS

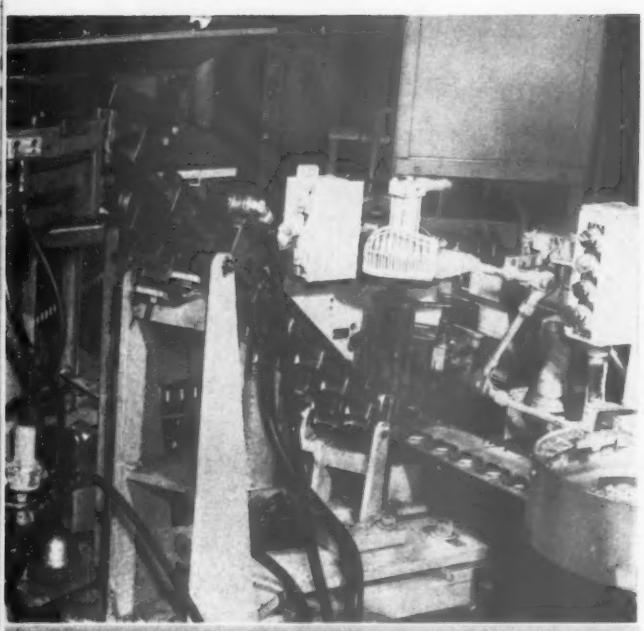
Conversion of additional assembly equipment now using relay circuits is being considered

by Darrell Ward, Field Editor

ENGINEERS at General Motor's AC Spark Plug Division have attained a considerable reduction of downtime on assembly machines using General Electric's newly-developed static control logic elements to replace relays.

The initial installation was made on an assembly machine at AC's headquarters plant in Flint, Michigan. The machine was designed in a joint effort by AC and the GM Process Development Section. This machine is conveyorized to handle two units simultaneously.

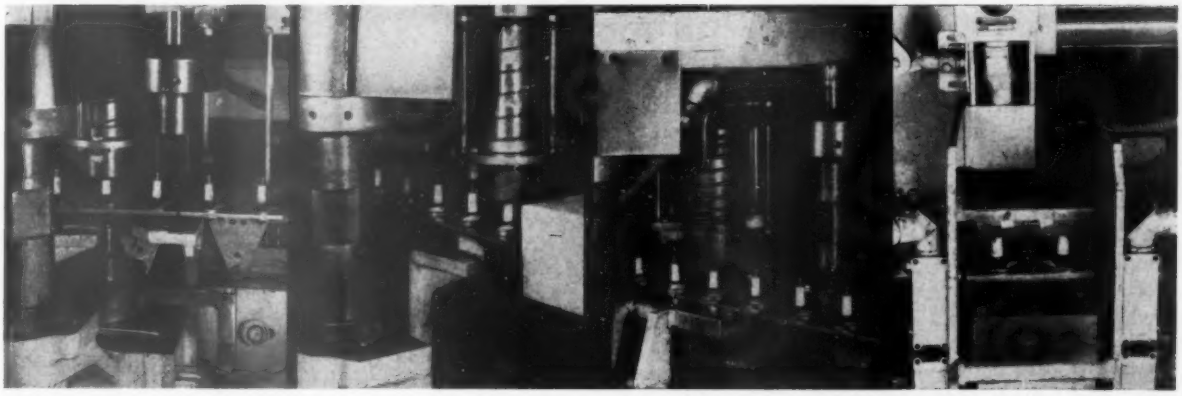
Metal shells, porcelain insulators, center wires, top connectors, top and bottom seals, and metal-glass filler-seal are all brought together in proper



First operation in spark plug assembly is feeding shell and wire unit from vibratory hopper down track. Escapement places unit in assembly machine's conveyor nest.

Shells are lifted from nest at left, and turned until the side wire is pointed outward. They are then re-set in the nest. Next the bottom gaskets are fed from vibratory hopper down a track and shuttled into a set of jaws. A punch descends and strips the gasket from the jaws and guides it into the shell. The outside diameter of the threaded sections is then gaged to determine if all threads are present. Succeeding operations, not shown, are hand loading of insulator assembly, and dropping top ring on spark plug.

LS FOR ASSEMBLY MACHINES



Left to right: top ring is pressed into the assembly while bottom insulator tip is held central; top portion of shell is crimped inward toward the insulator; shell is placed under compression from top and bottom while current passes through it—shrink groove heats up and collapses placing internal gaskets under compression, securing gas-tight seal; gap between centerwire and sidewire are set.

sequence ahead of machine functions which crimp the top of the shell to grip the insulator and seal ring, heat the shrink groove, and compress the length of the plug to produce the hermetically sealed product at the end of the line.

Each of these many functions on the assembly machine is specially engineered to meet AC's requirements and method of manufacture. Each is complex enough to be the subject of an individual discussion. The new conversions being made at AC, however, are not concerned with the individual functions of the assembly machines but with the controls which are normally equipped with an enormous array of relays and associated components.

Under normal use the relays used in assembly machines are completely reliable. In fact, most relays are considered reliable in general use for an almost infinite length of service. But when an assembly machine is operating fast enough to produce several thousand complete units in an hour, running three shifts a day around the calendar, "infinity" is reduced to a matter of months or even weeks. Therefore, in practice AC engineers had problems with relays. In an integrated multiple-operation as on the assembly machines, one defective relay can shut down the whole line and idle a number of employees. An occasional delay in a single operation for one or two operators might not be such a problem.

AC engineers investigated and experimented with static controls and chose GE because the company was willing to supply any or all basic components as needed. In addition, GE engineers worked closely with AC engineers to correct faults occurring in the system.

Some idea of the problem AC faced can be realized when one considers that the control panel of a single assembly machine contains 127 static control logic elements. The company is working toward conversion of a number of other pieces of assembly equipment in the near future.

The cost of such conversion is a major factor since the static units, which replace relay circuits, may average from 2½ to 4 times the cost of an equivalent relay circut.

WHAT ARE STATIC CONTROLS?

In the jargon of an electrical engineer, static controls are bias controlled saturable reactors. To the plant manager these elements are transformer-like units "potted" in cans with plug-in connections as easy to install or replace as a radio or tv tube.

Each can contains windings on a core of grain oriented steel. One winding is for bias current which affect the reactance of the other windings, depending upon their function. There may be one or more input windings and an output or gate circuit.

Different units are designated in terms of com-

continued

With no moving parts, static controls are ideal for multiple-function machines which hammer away at a rapid pace hour after hour

puter logic circuitry such as the AND, the OR, the NOT, and the MEMORY circuits. Each is designed to replace relays. Because of its design and application, the big feature of the entire static system is that there are no moving parts. Current flows or cuts off, in phase or out of phase, under precisely controlled Ohm's law conditions of reactance with no mechanical problems involved.

Units currently being used at AC Spark Plug include the "2-input AND" which is equivalent to 2 relay contacts in series when both must receive signals to produce an output signal; the "4-input AND," equivalent to 4 relay contacts in series all of which must receive a signal to actuate the output; the "3-input OR," equivalent to 3 relay contacts in parallel so that any one or combination receiving a signal will energize the output; the "2-input NOT," equivalent to 2 closed relay contact in series giving a constant output signal until either or both inputs receive a signal to cut off; the "permanent MEMORY," equivalent to a latched-in relay; the "release MEMORY," equivalent to a latched-in relay which will not resume the "on" position and must be reset after a power interruption; and finally the "delay element" which gives an output signal after a predetermined "adjustable" delay from the input signal. This latter unit is vital in a number of assembly sequences in which a cycle must be completed once it begins and shut off only at a specific degree of rotation in phase with other operations.

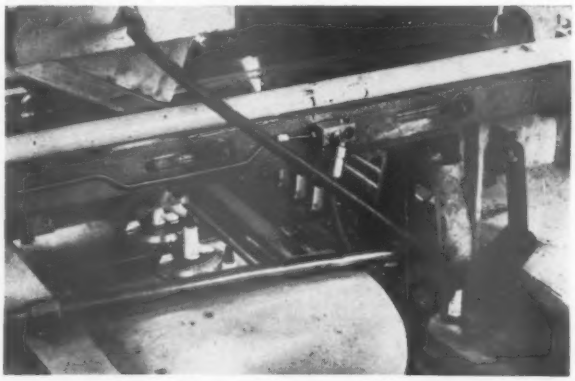
All these units are small current devices working on 7 to 8 milliamps. They feed into a magnetic amplistat to fire heavy a-c loads. The amplistats come in four different output ranges up to 300 va.

WHY NOT REPLACE ALL RELAYS?

Besides being more costly, the static control units are still more or less in experimental stages. A number of units have proved their value, while others are still being developed. Answers to every problem have not been uncovered yet. And like the early days of transistors, the static elements represent a new way of thinking to the engineer who will use them.

At the AC Spark Plug plant there was good reason for conversion, even on a trial basis. And once the system was tested, its obvious features warranted further conversion in future equipment.

AC engineers have found that in many applications ordinary relays are perfectly satisfactory and desirable. But in their new assembly machines, the



At the last station in the spark plug assembly machine, the completed unit is automatically transferred to the washer conveyor.

multiple functions, which hammer away at a rapid rate hour after hour and month after month, quickly telescope the life of any ordinary type of mechanical devices.

Two things have happened with relays under these conditions. First, the mechanical movement, pivots and armatures, wear out or break down rapidly under fatigue. Second, frequent arcing plus the impact of rapid make-break action over long periods of time generate a profusion of metallic dust. This dust accumulates inside the relay housing. This makes cleanliness a real problem and high resistance shorts a potential danger.

When the relay controls on some of the machines at AC are compared with the static control system, the temptation to make a conversion is strong. Static controls are perfectly clean, with no moving parts and no noise. Since there are both favorable and unfavorable situations for static controls, this leads to a specific question.

WHEN TO CONSIDER STATIC CONTROLS?

AC engineers had opinions with good reasons for answers to both sides of this question. If an operation requires recycling of controls as much as 400 to 500 times per hour, static controls would be worth investigating because this frequency of operation gives relays a lot of punishment. But this may not be the case unless the setup is to be longstanding for a high production run.

"Frequent downtime on a machine begins after about a year or less of operations with conventional controls," according to AC engineers.

continued

RB&W FASTENER BRIEFS

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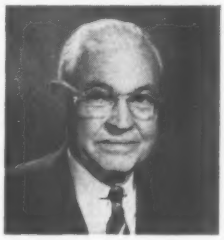


Technical-ities

By John S. Davey

Select proper bolt diameter

An erroneous rule of thumb worth forgetting is that no bolt under ⅝" should be used where fastened members are under stress. Yet bolts ½-inch and smaller take plenty of external loading.

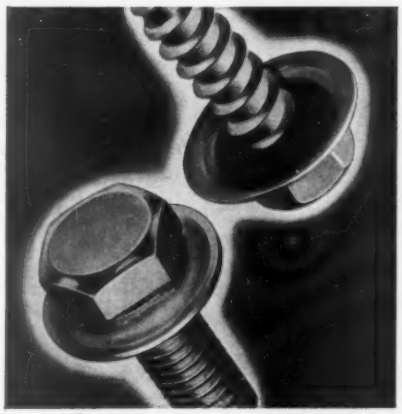
HOW TO LOOK AT IT

Primarily, you have to satisfy the stress requirements . . . the load. So select bolts on that same basis: the actual strength to sustain that load.

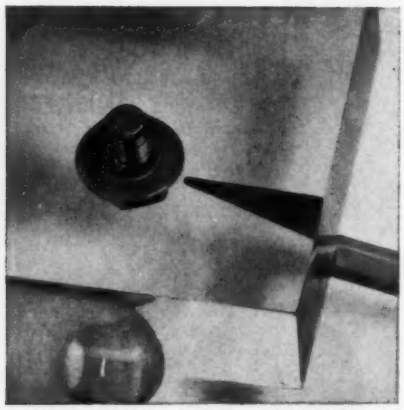
Calculating the strength requirements will tell you what bolt tensile, size, and number you need. If smaller bolts suffice, use them to avoid the penalty of overdesign. Holes can be smaller which means faster drilling and tapping. You have a chance to save materials since with smaller bolt holes, fastened members can often be made smaller too. You may also be able to standardize on a single size, saving assembly-line time.

SIZE VS. SAFETY

Remember that for a given grade of material, size tells you *capacity* of a bolt, not its *safety*. If you *tighten* a bolt to capacity, then you get safety. That's why a smaller bolt properly tightened is better and safer than a larger bolt sloppily tightened, especially where the loads are dynamic. Obviously, you reduce risk of under-torqued bolts as you reduce their size.



The new RB&W "SPIN SEAL" fasteners have spring-type washer with adhering flow-in seal . . . pre-assembled to standard machine or tapping screw.



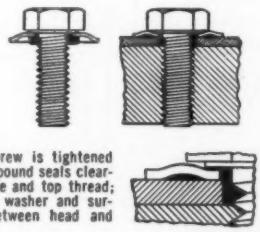
Flow-in sealant is confined by washer. Note how seal fills space under head and flows around and into threads in tightened SPIN-SEAL screw.

New SPIN-SEAL* screws give leakproof fastening

Here is a new type of composite fastener that seals by means of a unique flow-in sealant and washer.†

ASSURES TRIPLE SEAL

Concave in shape, the heat treated springy washer confines and controls the flow of sealing compound. Tightening the screw forces sealant into various spaces around (1) threads, (2) head and (3) clearance hole to give hermetic sealing.



When screw is tightened the compound seals clearance hole and top thread; between washer and surface; between head and washer.

The washer has ability to conform to curved surfaces and still seal securely against hydrostatic pressures and wind driven water. Its spring tension and flat rim give the added advantage of dynamic metal to metal seal.

ONLY THE SCREW TURNS

Washer does not turn with the screw. This prevents twisting or tearing the sealing "gasket", marring of polished surfaces, or gouging of painted finishes.

The flow-in gasketing compound is plastic rather than elastic. Stable and non aging, it won't split or ozone-check under pressure. It gives controlled flow into clearance spaces. Compounds are available to seal out water or oil.

Send for Bulletin SS-1 which gives details on RB&W "SPIN-SEAL" fasteners. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y. *T.M.

†U. S. & Can. Pats. Pend.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

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If the operation is a key function in an integrated line where many other operations may be shut down when a relay fails, this too might warrant conversion to static controls. Even then the cost of conversion must be weighed against the cost of downtime and other factors.

Static controls would be particularly advantageous if the replaced relays would be subject to oil mist, dust, or any explosive type atmosphere. Static logic elements are completely sealed and would show no arcing even if they were exposed.

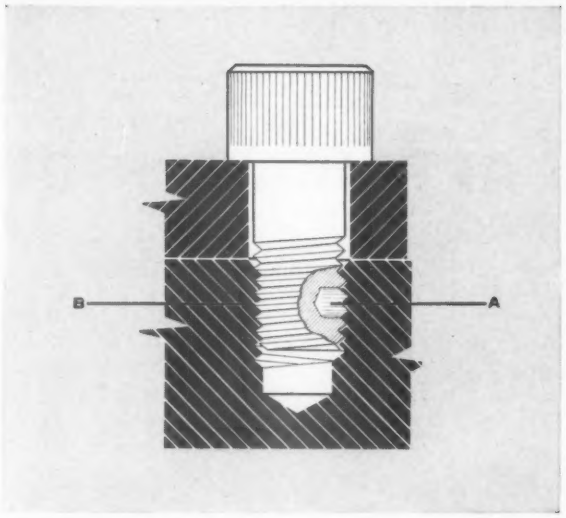
Finally, experience of engineers at AC Spark Plug indicates that static controls are desirable in place of very complex memory circuits as are required on their assembly machines. One of the most insidious problems with relay failure in such an assembly is to have one operation skipped in the middle of a run. Static controls simplify sequential triggering, memory and delay functions in controls related to the automatic positioning and checking of parts after each machine operation.

Countering this advantage, of course, is the need for engineers who are capable of utilizing the features of the various logic elements in designing controls for a given installation.

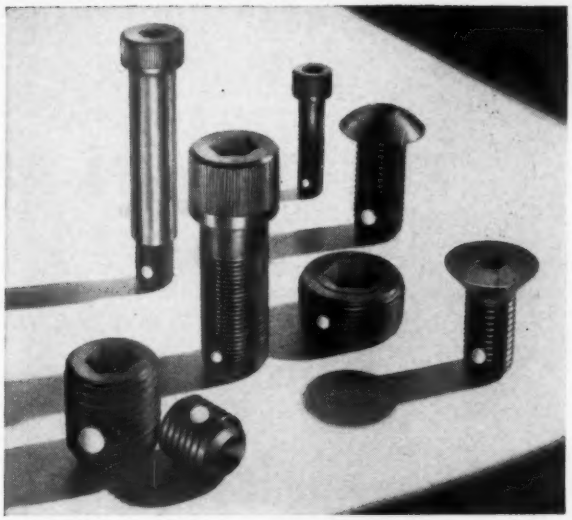
A feature which pleases both engineers and maintenance men after a static control system has been set up or serviced is that it requires no oscilloscope or other complex testing equipment. The simple checking equipment used at AC Spark Plug consists of an ordinary sensitive meter which gives a center scale reading near 7 to 8 milliamps, and a plug-in unit which plugs into the individual element sockets and permits testing a single unit outside the panel while a machine is in operation.

AC engineers say that the static system does not speed up the cycling of an operation. But it saves considerable downtime for maintenance of relays as well as wasted parts on the line. And, it is applicable anywhere that relays are commonly employed, on assembly machines, and on conveyor systems where constant switching is required. ●

"There goes that efficiency expert again."



How Nylok Locks. Resilient nylon pellet (A) sets up lateral thrust, smoothly wedging mating threads together (B). Locking action is entirely on threads and is positive, seated or unseated. UNBRAKOS with Nylok are easy to remove and are reusable.



Self-Locking UNBRAKO Socket Screws, in a full range of standard types and sizes, are stocked by your authorized SPS distributor. Permanently installed locking pellets are serviceable from —70 to +250°F and will not dry out, rot or shrink.

Only Screws That Stay Tight Are Reliable!

Use UNBRAKO socket screws with Nylok*

to increase the reliability of your mechanical assemblies

Fastener reliability is essential not only in the products you manufacture, but also in the machinery you use. Yet 9 times out of 10, the ordinary threaded fastener will work loose if subject to impact, shock or vibration . . . and it usually is. In the case of industrial equipment, this tendency of fasteners to loosen can mean added maintenance costs, production delays, or even damage to machinery. With consumer goods, it can mean extra service calls and repairs—irritating to the customer and, more often than not, unprofitable for the manufacturer.

Past efforts to solve this problem have involved use of lockwashers, cotter pins and wiring. These conventional locking devices are not always completely reliable. Lockwashers sometimes snap or lose their spring; and with cotter pins or wiring partial loosening is likely. Furthermore, these devices take extra time and labor to install.

UNBRAKO socket screws with Nylok offer you a simple, practical solution to this problem of fastener reliability. An UNBRAKO with Nylok is a single self-locking unit—requires no auxiliary fastening elements. The tough, resilient nylon pellet—permanently installed—forces mating threads tightly together, locking the screw securely, seated or not, wherever wrenching stops. It will not work loose, despite severe vibration.

Off the shelf, a self-locking UNBRAKO may cost you slightly more than an ordinary screw. But f.o.b. your product, it usually costs less . . . assembly time, labor and reliability considered. See your authorized SPS distributor for complete details. Or write us for literature and samples. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 78, Pa.

*T.M. Reg. U.S. Pat. Off., The Nylok Corporation

HIGH RELIABILITY

SPS research is continually developing fasteners with higher and higher standards of predictable performance. By installing SPS high-reliability fasteners in your assemblies, you increase your overall product reliability.

For more information on the full meaning of reliability, write for a copy of the new SPS booklet "High Reliability."

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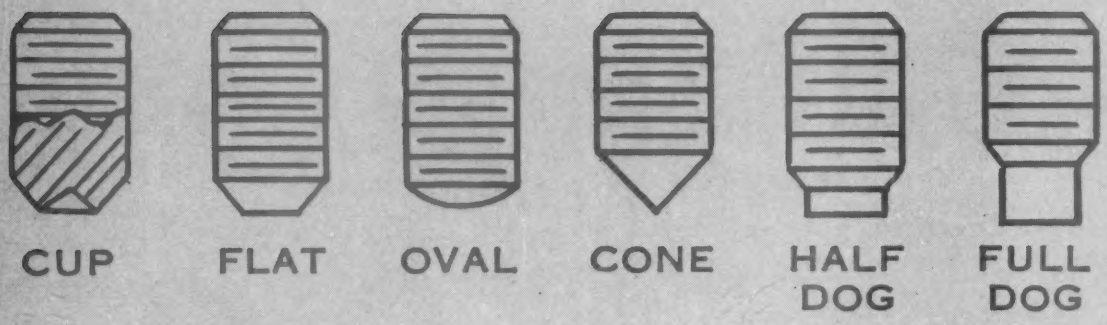
THE DESIGN AND APPLICATION OF

Factors to consider in set screw selection. The "fit" of screws vs. the "fit" of tapped holes.



JUST what is a set screw? How can one pinpoint a specific application of a set screw?

Generally, a set screw is inserted in a tapped hole of a collar or hub for the purpose of binding a rotating part, such as a pulley or wheel, to a shaft. A set screw might be chosen for this purpose in preference to press-fitting or keyed-fitting to permit easy assembly, removal or adjustment. While this function is basic for set screws, there are other applications for which the purpose is not to bind rotating parts together, although functionally the position may be adjusted and locked more or less permanently in place. In this broader meaning, the screw is definitely "set" and is rightfully called a set screw.

Most people think of a set screw as one without a head, with the screw being driven below or flush with the surface of the part in which it fits. These flush screws are far more practical and safer than

SET SCREWS

by **X. Raymond Dodge,** *Vice President, Set Screw & Mfg. Co.*

the sharp cornered projecting heads which were standard not too long ago on industrial machinery and farm implements. Actually, the modern socket and slotted set screws gained much impetus with increased interest in safety. In applications not for the purpose of binding a pulley to a shaft, for instance, headed or headless screws may each be preferred for specific reasons.

One such application may be in a relay. Set screws can be used for adjusting or regulating the action of an armature, or for positioning contacts. With this kind of screw—which "sets" in a fixed position for its function—adjustment may not be possible with a screw driver or socket key. Therefore, some other means of adjustment must be provided. This may be by the common external hex of a cap screw, by drilled holes for a special wrench, or a single hole for a rod-type or "tee" handle, or even a knurled knob turned with the fingers. In place of a knob or cap, others are secured to a dial or indicator needle. The outer ends of such a screw. flush or with a head, may be deeply seated, or it may project a convenient distance outside its tapped hole. Any of these can be called a set screw if they are designed to be turned for adjustment and left in position after adjustment is made.

Locknuts, springs, crimped metal, special threads, friction materials inside the threaded hole, or a washer binding against the screw to retain its position, would be common in this application. A typical example is the regulating screw in a thermostat.

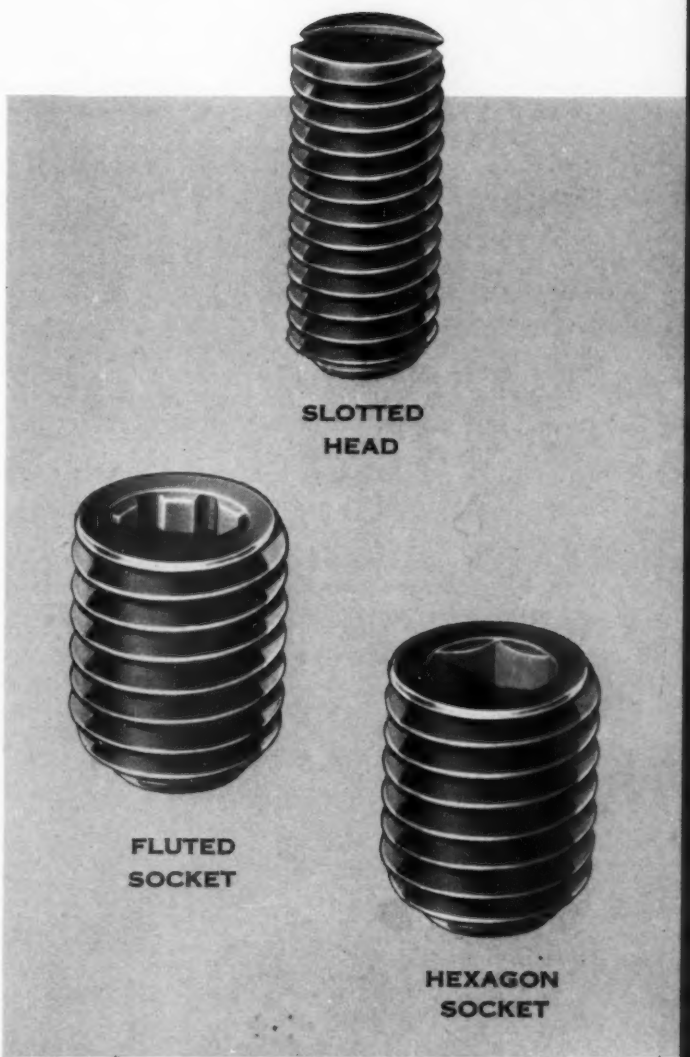
Still another type of set screw which conforms to the definition—but serves a dual purpose—is a cone point screw used as a pivot. Conversely, the set screw may have a cup point in which the balance staff point of a clock mechanism is seated as in a bearing. With or without jewels, the pivot point and the cup point would be true set screws, although trade practice may designate them by other names.

WHAT IS "STANDARD" IN SET SCREWS?

From the many screw manufacturers supplying the assembly and fastening field, there are myriads of shapes, styles and sizes. How can we limit our immediate concern to standard screws without trying to cope with every special type and variety offered?

Standard set screws are made in popular machine screw and fractional sizes and lengths, with coarse or fine threads. Points come in six basic types: cup,

continued



Above are three popular head styles in set screws while at upper left are six basic types of points.

flat, oval, cone, half dog, and full dog. It is usually taken for granted that the point will be cup-shape unless otherwise specified.

Basic head styles currently popular include the hexagon socket, fluted socket, slotted and slabbed. There are innumerable varieties of these, but here again the hexagon socket and slotted screws, driven by key or screwdriver, are far more prevalent than others. Square headed set screws and certain other styles considered standard in the past may be common in specialized cases, such as for farm implements, but are limited to their particular industries.

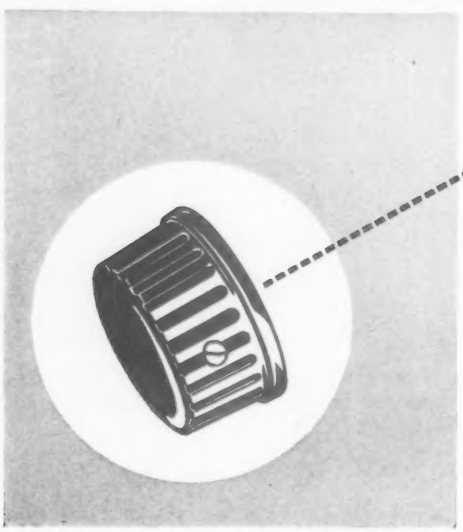
FACTORS IN SET SCREW SELECTION

To hold a part in position on a soft shaft, the cup point would be logical. This is typical for applications to small machines or fans in which a pulley would be locked in place on an unhardened shaft with no intention of readjusting or removing the pulley.

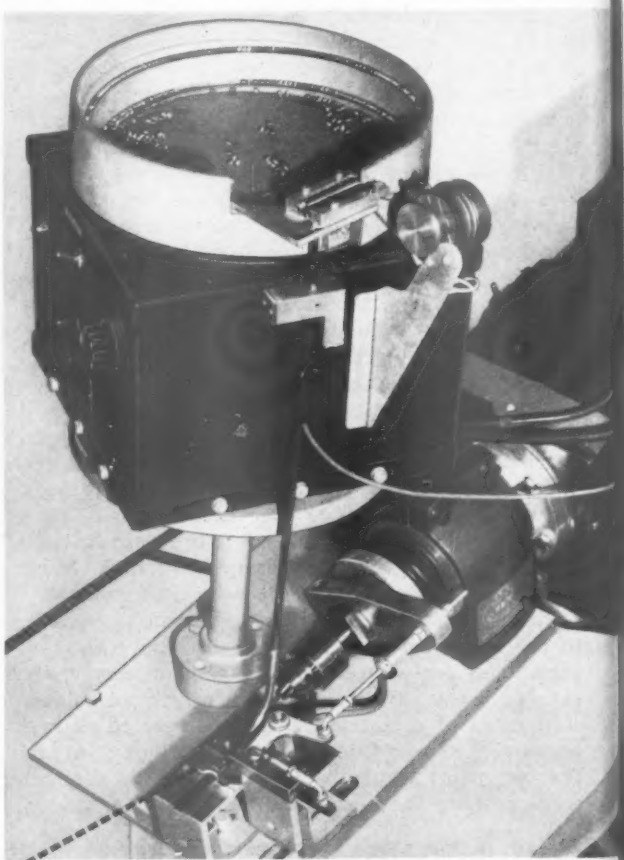
On the other hand, if a part such as a mandrel, spindle, cutting tool holder or other device must be readjusted or changed often, a hardened shaft may be required, and the cut point may not be applicable. In this case, a flat can be ground on the shaft, and a flat point, half dog or full dog would be indicated.

If it is not desirable to have a flat on the shaft, the situation could be met by "spotting" or drilling a small depression in the surface of the shaft to accept the point of the set screw. Then, any of the standard points would be applicable depending on load and other factors.

Here is a typical set screw application which has been automated through the use of hopper feeding and automatic driving. As soon as knob is positioned against microswitch, the screw is automatically inserted in knob.



Spotting for a set screw is especially important in the case of gears or cams, which must be precisely located, and for timing or synchronizing mechanical movements. In many instances, a series of cams may be mounted on the same shaft which is not splined or keyed for radially positioning each cam in relation to the others. A spotted point can provide for rather frequent removal, resetting or interchange of cams, and at the same time bring each back into its proper radial position within a few seconds or less of a circular arc. A dog point can provide substantial load bearing capacity to the point. A cone or pivot point can be used for positive location to close tolerances.



Spotting will prevent scarring the shaft as in the case with points which are set by biting into the metal.

LOCKING AGAINST ANNULAR MOVEMENT

For alignment purposes, as with a V-belt pulley, a flat or keyway in the shaft will give positive locking against annular movement. Simultaneously, it will allow longitudinal movement of the pulley along the shaft. If the shaft is left round with no depression for the set screw, it can become burred or

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scarred by even occasional changes of the set screw, and soon may prevent the pulley from sliding along the shaft. Short cuts or omissions like this in building machine parts frequently introduce intolerable problems for the machine user. Sometimes a shaft will become so damaged that a pulley can be removed only with a wheel pulley intended for press-fitted parts.

This is much more of a problem than many people think. Good quality cup point set screws are judged by their very ability to bite into the metal of a soft shaft. This feature has led to some mis-applications in which the deep bite into a shaft is not necessary or desirable.

METHODS OF DRIVING

The amount of bite or pressure developed against the shaft by a set screw with any type point partially depends on the style of head which determines the method of driving. The greater the wrenching action in setting the screw, the greater the pressure. This is why the old fashioned square head has lingered in popularity for farm implements. A farmer an almost always find some handy tool to wrench a square head tightly into place, or remove it for adjustment. Actually, there is little doubt that, with other things being equal, the square head lends itself to the greatest developed torsion with the least specialized tool. Square jaws and positive grip will do the job.

Next to the square head in utilitarian value is the slotted type screw. Driven properly with a screwdriver, it can be set with sufficient torque to satisfy many applications. Variations of this style include patented forms.

DEVELOPMENT OF TORQUE

There is some disagreement in engineering theory as to the amount of torque which can be developed in setting a slotted head and a socket head. In practice, it has been found that while a socket head may rank first in its ability to develop high torque and permanent locking, it would be incorrect to discount the square head in driving facility. Instead of "just any old wrench" to drive the screw, every socket head screw will require a special wrench or key of special size and design.

The principal reason for the selection of one style over the other may be just a matter of economics. The slotted screw generally is the least expensive And where a socket is not required to hold the screw to the driver, this style may be more economical.

Though the hexagon socket type are slightly more expensive, they are popular for a number of reasons, including great strength, accuracy, ease of insertion and reliability of setting. They require only a minimum wrenching arc, with virtually no danger of damage to the socket or disengagement when driven. If a sealed fastener is required, the socket can hold the sealing wax.

The use of set screws for fastening is most practical for numerous assemblies, especially those which may require readjustments. A single turn of the tool will set or loosen the part, with the set screw still in place ready to be reset.

THREE TYPES OF THREADS

Metal set screws are made by several different methods. The threads may be cut, rolled, or ground, while the sockets or slots may be cut, broached, or formed by cold heading. Some manufacturers employ one method while others employ several.

Rolling tends to make the grain of the metal conform to the profile of the thread. Cutting and grinding removes metal to form the thread. If one wishes to explore the fine technical points of metallurgy as they pertain to shearing action, this might be a subject for serious discussion.

Actually, the setting of a socket style screw can break a hardened steel key before any damage is done to the screw threads, regardless of how the threads are made. In the case of a slotted screw, everyone has had the experience of damaging the slot with a hand-held screwdriver. In most situations, the slot can be chewed to bits before any perceptible damage can be detected in the threads.

Ground threads are inherently more expensive than cut or rolled threads, but are desirable in certain applications because of their accuracy and more lustrous finish. Since the grinding can be done after heat treating, high accuracy can be secured. In addition to beauty, precision ground threads would be used in such instances as the close fit of a micrometer screw. But this need for close tolerance and finish in set screws is rare. Instrument making would be an example where both the close tolerance and appearance of the ground thread would be advantageous.

THE "FIT" OF SET SCREWS

Set screws are commonly offered in Unified Class 3A fit. This class fit is normal for the manufacture of a high grade threaded part which can be assembled with the fingers. It will have a minimum amount of "shake," and may require tool-driving in a deeply seated screw. In practice, it is very hard to detect the difference in how much torque it takes to drive a Class 2 or a Class 3 fit thread.

Some engineers tend to become too involved in the intricacies of close tolerance fits. This is quite often foolish. The reason is that when an engineer or designer is overly meticulous in the details of the class of thread on a screw, he often neglects to specify an equivalent fit in the tapped hole. Generally, there is no purpose in specifying

continued

any particular tolerance in the screw thread unless the same tolerance is maintained in the tapped hole.

Engineering theory is sometimes concerned about the amount of "fret" or the tendency to shake loose under vibration. There may be some concern for this in the loose fitting classes of threads where there may be a difference of .002—.003″ to possibly .005″ separation between the metal of the tapped hole and the following flank of the screw thread. Design practice must necessarily be consistent, and specify a class of fit on the screw thread as well as in tapped hole—if there is any concern for this factor at all.

TOLERANCE AND THE LEAD ERROR

It must be kept in mind, of course, that other tolerances on the screw must be closer on a higher class fit. For instance, the lead error on a Class 3A or tighter fit must be far less than the lead error on a looser fit such as the Class 2A. Therefore, if a designer specifies closer tolerances than Class 3A on a screw, he should expect to pay a higher price. As the screw becomes longer the lead error becomes more important. In some instances, actual practice may determine that a very long screw in a Class 2A fit will result in less fretting than a short screw in Class 3A fit. These fine distinctions, it must be remembered, are in most cases of no practical concern.

Designers who become too involved in fine distinctions very often make extra work for themselves and add extra cost to the value of their work. The net result could conceivably be a far higher cost of production, and with a finished product of no better quality.

CONSIDERATION FOR LOAD FACTORS

The main question which a designer should be concerned with is: Will the screw take the load, and will it hold the parts together under normal operating conditions?

How can a designer approach this problem and know that the screw will do the job, and that his selection is the right choice for that particular application?

Merely consider the operating conditions under which the screw will be used. Then, if practical, use the largest set screw that can apply. Where a difference in cost may be the point of concern, then a slightly smaller size can be determined as sufficient by experiment.

The selection of a particular size or kind of set screw can also be influenced by physical and mechanical factors. One would be the size of the shaft. Another would be the thickness of the metal in the collar where the screw is to be inserted. Still another would be the amount of load, while a fourth consideration would be the amount of vibration to which a part is to be subjected.

In an extreme case, it may be necessary to select

a set screw of a diameter almost equivalent to the diameter of a shaft, provided there is sufficent metal in the collar or hub for the screw. Though such an exaggerated proportion would hardly ever be seen, it is conceivable that a designer could have reasons for applying an extraordinarily large screw.

A very long set screw may be purposely chosen in the case of a deep hole for the specific purpose of preventing the screw from shaking loose under vibration. This is accomplished by the simple expedient of having more threads in contact.

In addition to the formula of selecting the largest screw practical, but one small enough to be economical in application, a further rule of thumb is to maintain a minimum length of screw equal to approximately one and one-half times the diameter. Generally this rule will approach an ideal compromise.

FINE THREADS VS. COARSE THREADS

If a hole is tapped in steel, and the screw length will be about one and one-half times the diameter, then either a fine thread of a coarse thread may be optional. The fine thread provides a little more friction to resist loosening of the screw. But at the same time, a fine thread set screw cannot be driven with as much force against the shaft and results in less holding power between part and shaft. This is because fine threads require more torque of offset the greater friction of thread engagement.

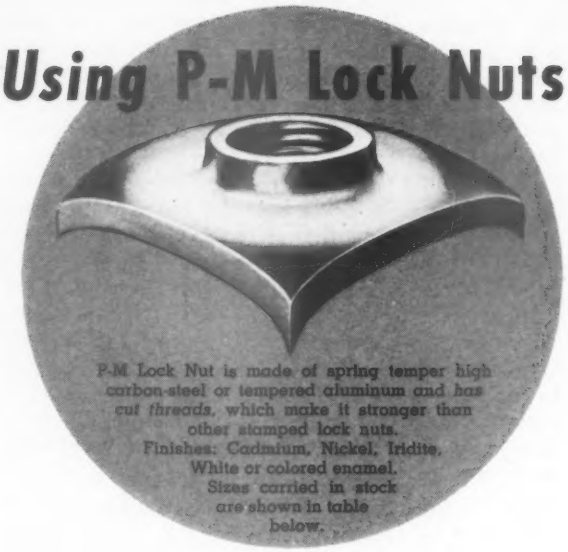
In soft metals, a coarse thread is preferred because it makes a larger bearing surface in the metal against the pressure flank of the screw thread. Also, in dealing the soft metals, it is advisable to have a thicker collar or hub to make the length of the screw at least one and one-half times the diameter, and much more if possible.

There are many situations or working conditions which may influence the selection of a thread type other than the extremes between a tool steel and a very soft metal. For instance, in tapping a hole in a thin drawn metal it may be advisable to use the finest threads possible.

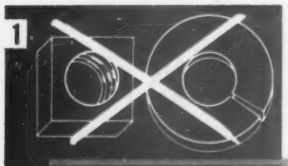
Another factor relating to the choice of fine threads concerns practical consideration for production shop practices. The designer must keep in mind that the tapping of a fine thread is a somewhat more delicate operation than for a coarse thread. Therefore, if the choice lies between the two, the coarse thread could be a far better choice for these reasons: easier to tap good threads and at a somewhat higher production rate, and much less danger of crossing when starting a set screw particularly if the operation is automated.

Since it is commonly conceded that not enough attention is given to the design and application of set screws, it is advisable that designer and engineers consult with their fastener suppliers on specific applications. Because of the very nature of their diversified experience, manufacturers of fasteners can often come up with a simple direct answer to a problem which may be quite puzzling to someone else. ●

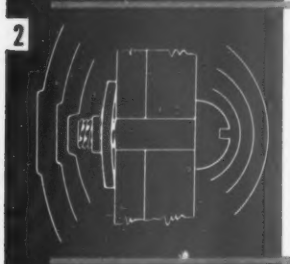
6 NEW WAYS
To Improve Assembly, Using P-M Lock Nuts



P-M Lock Nut is made of spring temper high carbon steel or tempered aluminum and has cut threads, which make it stronger than other stamped lock nuts.
Finishes: Cadmium, Nickel, Iridite, White or colored enamel.
Sizes carried in stock are shown in table below.

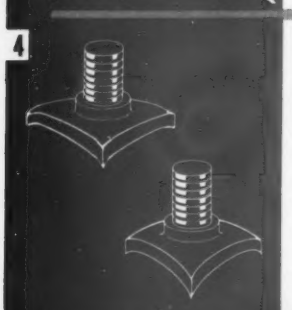


1 **Eliminate Double Handling** — No lock washers needed — P-M nut is self-locking. Cuts assembly time and cost.

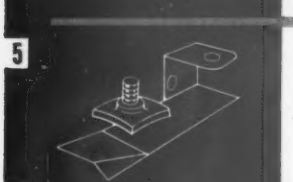


2 **Get 7 Times More Vibration-Proof, Holding Power** —Under vibration tests conducted in accordance with Military Specification MIL-N-25027 (ASG) P-M lock nuts proved to have seven times greater holding ability than ordinary nuts with lock washers.

3 **Speed Up Blind Fastening Applications**—The concave under surface of P-M lock nuts guides screw to hole threads.



4 **Use Only One Type Of Fastener For Both Permanent and Demountable Assemblies**—When P-M lock nut is tightened flat, threads are deformed against the screw for permanent fastening—When tightened to recommended torque, locking pressure is applied to threads but nut may be disassembled and re-used.



5 **Make Use Of P-M Lock Nuts Versatility** — To simplify assemblies and reduce cost.

6 Send Coupon For Further Information, Samples, Prices, etc.

PART NUMBER	SIZE AND THREAD	FINISH	DIMENSIONS A	B	M	RECOMMENDED SEATING TORQUE	AVERAGE ULTIMATE TENSILE
6000	6-32	PLAIN	5/16	7/64	.032	8 in. lbs.	1050
6001	6-32	CADMIUM	5/16	7/64	.032	6 in. lbs.	1000
6002	6-32	NICKEL	5/16	7/64	.032	8 in. lbs.	1050
8000	8-32	PLAIN	5/16	7/64	.032	8 in. lbs.	1325
8001	8-32	CADMIUM	5/16	7/64	.032	6 in. lbs.	1300
8002	8-32	NICKEL	5/16	7/64	.032	8 in. lbs.	1325
10000	10-24	PLAIN	3/8	1/8	.032	12 in. lbs.	1600
10001	10-24	CADMIUM	3/8	1/8	.032	10 in. lbs.	1400
10002	10-24	NICKEL	3/8	1/8	.032	12 in. lbs.	1600
10003	10-32	PLAIN	3/8	9/64	.038	14 in. lbs.	2300
10004	10-32	CADMIUM	3/8	9/64	.038	12 in. lbs.	2100
10005	10-32	NICKEL	3/8	9/64	.038	14 in. lbs.	2300
14000	1/4-20	PLAIN	7/16	3/16	.058	40 in. lbs.	2400
14001	1/4-20	CADMIUM	7/16	3/16	.058	38 in. lbs.	2300
14002	1/4-20	NICKEL	7/16	3/16	.058	40 in. lbs.	2400

WATERBURY PRESSED METAL CO. PM-1
300 Chase Ave. Waterbury, Conn.

Gentlemen:

- ☐ Please send samples of P-M lock nut in various sizes available from stock.
- ☐ Please quote prices on.....(approx. quantity) of..... size P-M lock nut.
- ☐ Send samples and information on Flanged nuts and Hollow Roll Studs.
- ☐ Please have your local representative call.

Name.....

Title.....

Company.....

Address.....

City.....Zone..... State.....

WATERBURY PRESSED METAL CO.

300 Chase Ave., Waterbury, Conn.

P-M Lock Nuts

Hollow Roll Studs (For Roller Axles)

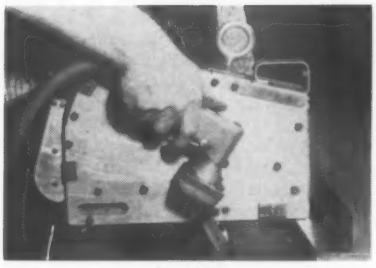
Flanged Nuts (Function as nut and washer)

Special Fasteners Designed to solve specific problems.

Use postpaid card. Circle No. 248

WHAT'S NEW IN EQUIPMENT

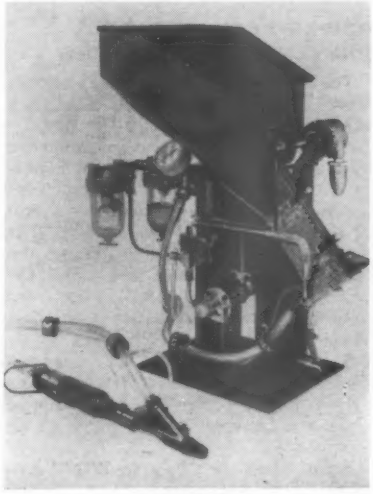
For information on any equipment listed here, use the postpaid card opposite page 72. Just circle the number on the card matching the number following the description. We'll do the rest.



(See 104)

(See 103)

(See 101)



(See 102)

FASTENER LINE MORE COMPACT, LIGHTWEIGHT

Aircraft type fasteners fabricated from high alloy die steels and a variety of stainless steels are now available.

The new fastener specifications have been developed primarily to meet recent demands for miniaturized fastener designs for use in new missile programs. It is said the new materials permit use of smaller, lighter components with no sacrifice in strength. They are recommended for use in elevated temperature applications where unusually high strength is required.

Fastener strengths formerly achieved only at room temperature are provided up to 900° F. by some of these materials. In addition, fastener performance has been satisfactory in certain applications at temperatures well beyond 900° F.

Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Mich.

Use postpaid card. Circle No. 101

JET-SETTER DRIVES 50 SCREWS A MINUTE

Introduced to the automatic screw-driving field, Parker-Kalon's Jet-Setter incorporates a tapered (conical) plastic-covered head reported to drive 40 to 50 screws per minute.

The machine is controlled by a pneumatic "brain center" which guarantees only single screw feeding. In succession screws are blown through the transparent plastic tube to a three-jawed "screw-hold" where they are gripped as in drill chuck. This retains the screw in driving position, regardless of the driving angle, so that the screw itself acts as a finder or drift.

The Jet-Setter drives all types of standard commercial screws—including those with pre-assembled washers—and will handle diameters from No. 4 through ¼" and length through 1¼". It can be used anywhere within 20 feet of the hopper-feeder, which holds a 5-8 hour supply.

Parker-Kalon, Clifton, N.J.

Use postpaid card. Circle No. 102

LINE CLAMP PLIERS SPEED ASSEMBLY

A line clamp pliers engineered for use in cramped quarters is claimed to speed single or multiple line clamp assembly. Model No. 82 simultaneously holds the clamp bolt, compresses the line clamps(s) and automatically holds them in closed position, leaving both hands free to apply the clamp nut or additional clamps. As many as three clamps on one assembly are held in position automatically by a retaining pawl. More than three clamps and clamps with spacers can be handled manually with the 7½" pliers forged from heat treated steel.

B. K. Sweeney Mfg. Co., Denver 16, Colo.

Use postpaid card. Circle No. 103

METAL STAPLER FASTENS UP TO .080" STEEL

The P-10 stapler fastens steel (including stainless and galvanized), copper, aluminum, rubber, plastics, fibers and similar materials like-to-like or in combinations.

It handles a maximum combined thickness of approximately .080" steel, depending on hardness. In fastening other materials, the P-10 fastens up to ¼" total thickness, depending on the nature of the material. When fastening a combination of metal and other materials, the capacity depends on the combined hardness and thickness.

Bostitch, 2002 Briggs, Dr., East Greenwich, R.I.

Use postpaid card. Circle No. 104

DISPENSER REDUCES WASTE OF SAFETY LOCK WIRE

A dispenser to reduce waste of safety lock wire has been introduced to industry. The wire, used to lock nuts and other fasteners subject to vibration, is packaged by National-Standard in one-pound dispenser cans.

Wire is coiled uniformly to prevent tangling and is pulled through a hole in the top of the package. It is pro-

duced in standard sizes—.020" through .041" diameter—including the .032" diameter most commonly used in aircraft work.

Time is saved by providing mechanics with the exact wire sizes required for a job and waste is reduced by enabling each man to cut exactly the wire length desired while on the work site.

Another dispenser feature is the elimination of the need for securing the wire end after a length is cut, which must be done to prevent tangling on conventional spools.

National-Standard Co., Niles, Mich.

Use postpaid card. Circle No. 105

MACHINE FEEDS UP TO 30,000 PARTS HOURLY

A vibratory bowl feeder handles miniature parts at speeds up to 30,000 pieces per hour.

Based on a standard 5" bowl vibratory feeder, the Micro-Feeder has a special sorting arm which dispenses material in single file. The most minute pieces are moved from the base of a storage bowl along a spiral track to a sorting bridge where each piece is positioned and moved toward two gates. The first gate eliminates piggy-backs; the second, doubles. An almost completely automatic classifying operation is possible.

It will handle pieces down to .001" in thickness and up to .250" in dimension. It can feed spheres, rounds, squares, rods, tubes, etc.

Affiliated Mfg. Co., Lebanon, N.J.

Use postpaid card. Circle No. 106

DEVELOP NEW MINIATURE ALLOY STEEL WRENCHES

Two miniature wrenches of 15° and 75° angle openings to fit various sized openings from 3/16" to 5/8" are being produced. Both are 5½" long with heads 3/16" thick. The No. 1136 has 9/16" openings, the No. 1140, 5/8" openings. Drop forged of alloy steel.

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago 46, Ill.

Use postpaid card. Circle No. 107

ADHESIVE JOINS METAL WITH CONTACT-PRESSURE

Maraset resin No. 532 is a versatile, general-purpose high-strength adhesive requiring only contact pressure for a durable bond that will not delaminate even under heavy duty. It is claimed to have marked resistance to water, chemicals, and solvents.

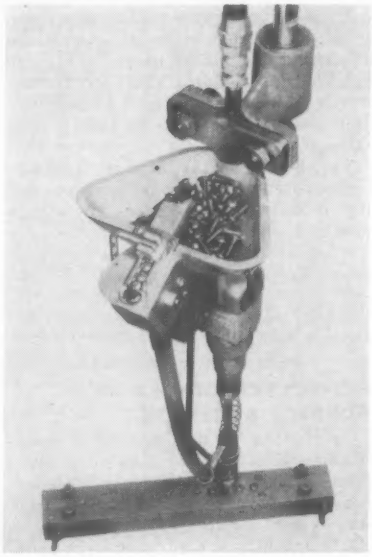
Primarily developed for joining metals to metals, the new resin has shown excellent results in bonding other materials and combinations of materials—including glass, plastics, wood, and masonry. Reinforced with fibrous glass cloth, it is an efficient medium for the repair of tanks and vessels.

An aluminum-to-aluminum bond created by Maraset resin No. 532 has demonstrated tensile shear strength of 2,000 psi after a room-temperature cure, and 3,800 psi after a single-hour heat cure. Seven-day tests showed the 3,800 psi strength maintained after immersion at 77° F. in water; 3,300 psi in hydrocarbon fluid; and 3,100 psi in JP-4 fuel.

Marblette Corp., 37-31 Thirtieth St., Long Island City 1, N.Y.

Use postpaid card. Circle No. 108

AUTOMATIC SCREW FEEDER FITS ANY PNEUMATIC TOOL



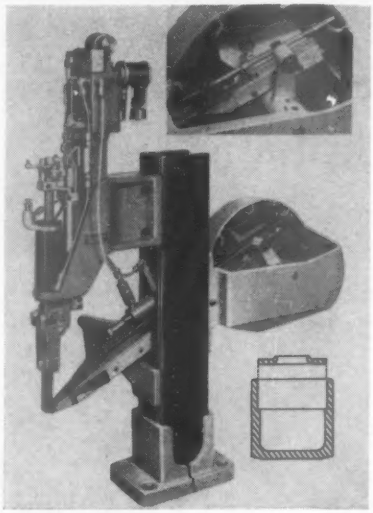
An automatic, precision screw feeder which fits all makes of pneumatic fastening tools and will drive any type of headed screw has been developed.

Working to close tolerances, the Zipp screw feeder drives screws so they abut one another exactly. It can be mounted on a balancer, fixed position stand, air press lift table, pull down foot operation press and elsewhere. It may be attached to screw drivers, nut runners, impact wrenches, pneumatic cylinders, electric drivers and can also be used in multiple set-ups.

Dept. 123, Zipp Screw Feeder Div., R. C. Neal Co., Inc., 76 Pearl St., Buffalo 2, N.Y.

Use postpaid card. Circle No. 109

MACHINE POSITIONS 6,000 PARTS AN HOUR

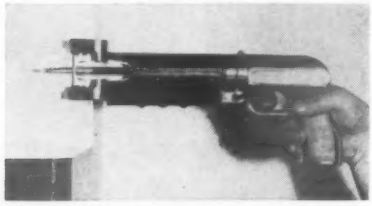


The Auto-Positioner is actuated by compressed air. Designed to handle piece parts ranging from 1/16" to 2" approximate size, the positioner automatically transfers the parts from feeder to fixture at speeds up to 6000 per hour. It requires no auxiliary motor or vibrator.

The feeder for the positioner head has a straight track and a positive-acting escapement, which permits low angle track mounting. Its mounting between the members of the dual column permits easy adjustment and saves space for close nesting of the units when installed at multiple stations.

Dixon Automatic Tool, Inc., 2300-23rd Ave., Rockford, Ill.

Use postpaid card. Circle No. 110



POWER-ACTUATED TOOL PREVENTS OVER-DRIVING

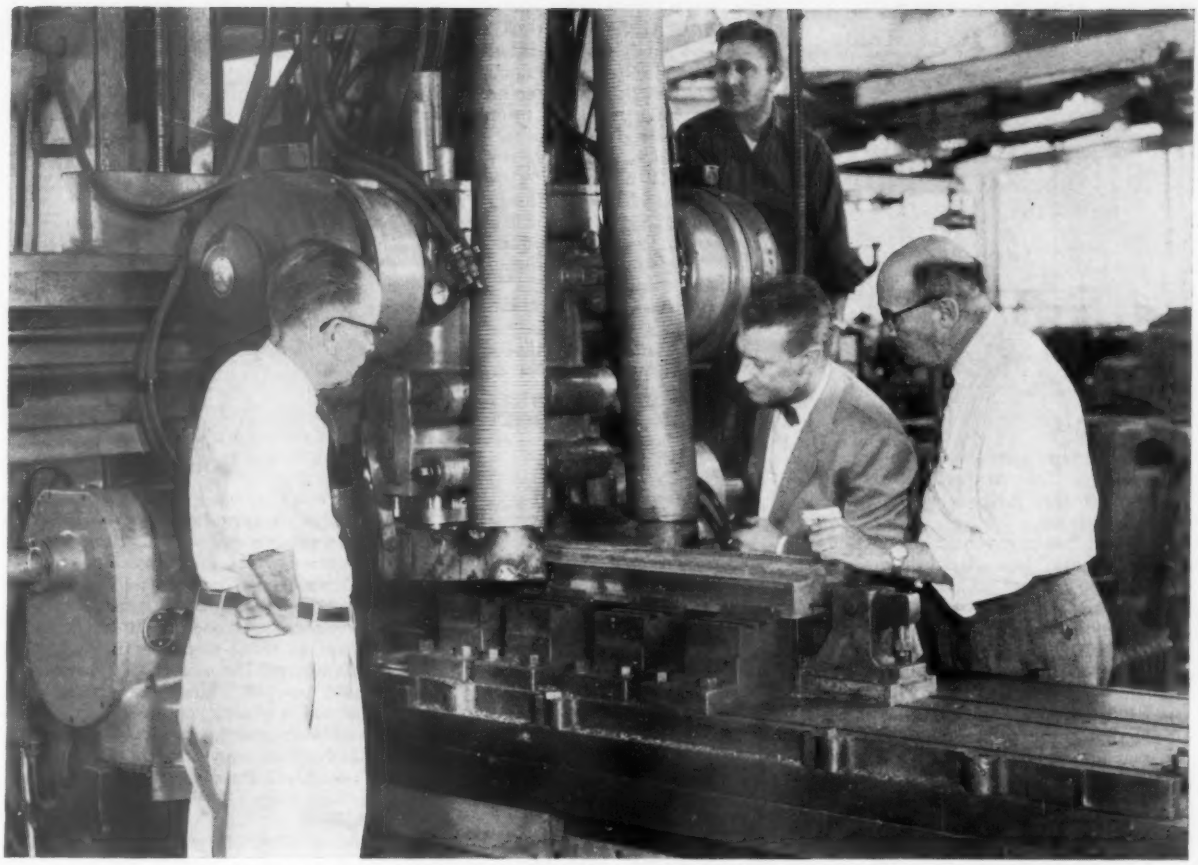
The Flite-Chek tool prevents an overdriven fastener from firing through a work surface.

Control of the fastener is accomplished by tapered interceptor jaws which prevent free-flight of an overpowered fastener or one that encounters a soft or thin spot in the work surface. The fastener is stopped before it leaves the tool. When the fastener is checked, the operation simply pulls the tool off the work and is ready for another fastening. There is no damage to the tool.

A pull of the trigger seats a special fastener into a wide variety of non-brittle material. The tool is capable of sinking a fastener into as much as an inch of steel.

Ramset Fastening System, 12117 Berea Blvd., Cleveland, Ohio.

Use postpaid card. Circle No. 111



Left to right, Ira R. Ogilvie, Sales Promotion & Advertising Manager of George Gorton Machine Co., the machine operator and Darrell Ward, Field Editor of Hitchcock Publications, and William P. Lipp, Gorton Plant Superintendent, watching the machining operations on the bottom of a milling machine table.

THE MAN FROM HITCHCOCK

Darrell Ward, Hitchcock field editor, was impressed with what he saw at the George Gorton Machine Co., Racine, Wisconsin. And with good reason, because he was looking at a specially built planer type mill designed to perform a revolutionary machining operation—17 operations on all surfaces in only two passes. He saw a triumph of automation that will boost production and lower manufacturing costs.

Darrell typifies the men from Hitchcock who continuously probe the metalworking, woodworking, and public passenger transportation industries. Their accurate reporting and timely editorial have won maximum readership from the audiences they serve.

If your interest is only in media quoting highest circulation and page sales figures, then readership probably won't mean much to you. But if you are planning a program directed to metalworking, woodworking, or public passenger transportation people built on the solid reality of proven readership, then Hitchcock publications will do a power packed, undiluted sales job in your market.

METALWORKING

Machine & Tool Blue Book
Machine & Tool Directory
Grinding and Finishing
Carbide Engineering

WOODWORKING

Hitchcock's Wood Working Digest
Hitchcock's Wood Working Directory

TRANSPORTATION

Mass Transportation
Mass Transportation's Directory
School Bus Trends

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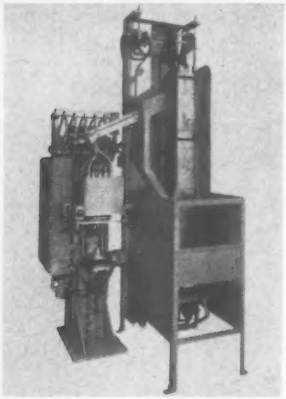
SINCE 1898

THE PIONEER OF CONTROLLED CIRCULATION

DRIVES SEM-TYPE BOLTS FIVE AT A TIME



Five sem-type bolts are driven simultaneously to close torque requirement limits with this multiple spindle bolt driving machine.

The unit has many high production, semi-automatic bolt driving applications. The design is available as a multiple-spindle bolt driving head for completely automated production lines.

Bolts are fed by an elevator-type, hopper feeder with a large capacity bin. Spindles are individually adjustable to proper bolt torque, meeting exacting production requirements. The bolt driving machine is air/electrically operated (built to J.I.C. specifications).

Gray Equipment Co., 13600 Ford Rd., Dearborn, Michigan.

Use postpaid card. Circle No. 112

NUT RUNNERS DELIVER 2000 IMPACTS A MINUTE

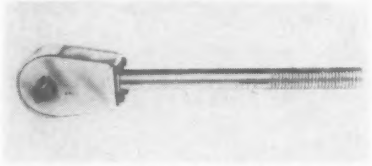
Two new models of air-powered Impactools can deliver 2000 impacts per minute at 90 psi air pressure. Both machines can handle nut running jobs up to 5/8" bolt sizes.

Model 508IT has an adjustable torque range from 50 to 150 ft-lbs. When the preset torque is reached the tool shuts off automatically. It weighs 9⅞ pounds. Model 5081, without torque control, weighs 8⅝ pounds. Muffling of drivers have been designed so that the operating air passes through three expansion chambers to minimize noise.

Ingersoll-Rand Co., Phillipsburg, N.J.

Use postpaid card. Circle No. 113

MANUAL IMPACT WRENCH TIGHTENS LARGE BOLTS



The latest addition to a line of hand-operated impact wrenches is a rugged, brute force wrench capable of delivering all of the power that a 1" square drive can withstand.

The Swench 1000 wrench claims the ability to deliver torque values up to 15 times that applied by the operator.

The Swench 1000 has two drive extensions which fit standard 1" square sockets. One extension is used for tightening, the other for loosening thread fastenings. The wrench is 26½" over-all, weighs 23 pounds.

Swenson Engrg., Box 43, Branford, Conn.

Use postpaid card. Circle No. 114

BRAZING ALLOYS MADE IN FLEXIBLE SHEETS

Brazing alloys are now available in flexible sheet stock form with substantial cost savings claimed wherever large contact surface areas are involved.

Tests and pilot production applications reportedly indicate that Nicrobraz exhibits flow and wetting properties equal to those of conventional brazing alloy forms. The material, in sheets from 0.015" to 0.060" thick, is recommended for use in brazed laminated sections and sandwich configurations of stainless steels, high alloys and titanium.

Stainless Processing Div., Wall Colmonoy Corp., 19345 John R St., Detroit 3, Mich.

Use postpaid card. Circle No. 115

ALUMINUM SOLDERING ROD REQUIRES NO CLEANING

A new alloy specifically designed for soldering aluminum, is now available for use in a wide range of joining and filling applications.

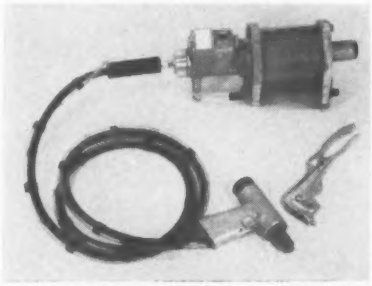
The new rod is reported to provide a good color match and is clean to use, requiring no flux, washing or wire brushing. Pre-cleaning and post cleaning are claimed unnecessary.

The Airco 720 A1-Solder is applied by rubbing across joints which have been heated. The flame is not directed on the rod. Melting and wetting takes place 400° to 500° below the melting point of the aluminum at a temperature of 720° F. The heating process can be repeated if necessary until the aluminum sections have been brought to temperature.

Air Reduction Sales Co., 150 East 42nd St., New York 17, N.Y.

Use postpaid card. Circle No. 116

PORTABLE RIVETING TOOLS FOR BLIND APPLICATION



Two lightweight riveting tools, designed for both assembly operations and product maintenance and repair, can be used for setting small rivets up to 3/16" diameter in standard, overhead, or blind applications.

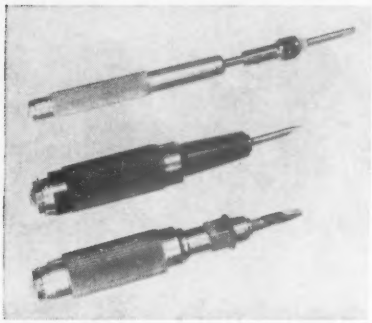
A hand tool just slightly larger than ordinary household pliers will set aluminum rivets of 3/32", 1/8" or 5/32" in diameter, and monel or steel types up to 1/8" in diameter. An air-hydraulic gun that weighs approximately 2 lbs. will pull monel rivets up to 3/16" in size.

The powered tool, designated as a PRG Hydraulic Gun, consists of an air-hydraulic intensifier, a portable riveting gun, and connecting hoses. The rivet can be placed either in the gun or the work, and the cycle completed by a light squeeze on the spring trigger.

Pop Rivet Div., United Shoe Machinery Corp., West Medway, Mass.

Use postpaid card. Circle No. 117

HAND DRIVERS HAVE TORQUE UP TO 6, 25, 60 INCH-POUNDS



Three new designs of Safe-Torque hand-operated drivers have work capacities of 0 to 25 inch-pounds; 0 to 60 inch-pounds; and 0 to 96 inch ounces.

Torque is preset by engaging the internal adjusting screw with a conventional socket head wrench, turning it clockwise to increase torque and counter-clockwise to decrease torque.

The two larger sizes of drivers have a calibrated torque adjusting screw at the top. Once preset to the desired torque, the driver will repeat to plus or minus one inch-ounce. Repeated tightening, changes in temperature or humidity, and other external variables reportedly do not affect the torque setting once it is made.

Scully-Jones & Co., 1901 S. Rockwell St., Chicago 8, Ill.

Use postpaid card. Circle No. 118

LEADED GREASE REDUCES MAKE-UP TORQUE 75%

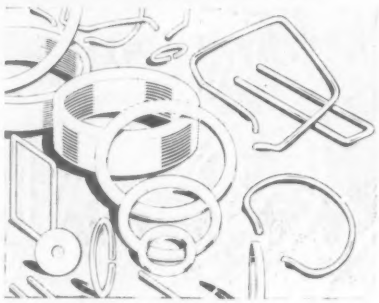
A leaded grease to prevent galling of threaded parts claims excellent results for reducing wrench torque in the make-up of "bite" type tube fittings.

Ferulube is reported to reduce make-up torque up to 75% when used on the ferrules and threads of the fittings.

Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio.

Use postpaid card. Circle No. 119

ALLOY BRAZING PREFORMS USE NON-TANGLING COIL



Brazing preforms incorporating a no-tangle notch coil principle are now available in alcoa alloys: 718—brazing wire and sheet, 716—brazing wire, and 713—brazing sheet in any size.

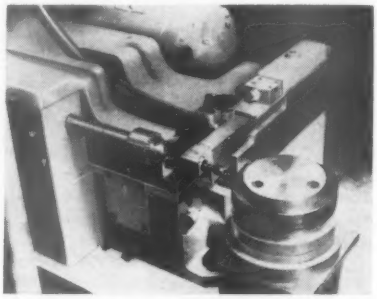
Lucas-Milhaupt Engrg Co., 5051 S. Lake Dr., Cudahy, Wis.

Use postpaid card. Circle No. 120

AUTOMATIC SET SCREW DRIVER CYCLES AT 2500

The Setomatic automatically feeds, inserts and tightens socket set screws ranging in diameter from 0.138" (No. 6) up to ⅜", in lengths up to ¾".

It can make up to 2500 complete installations an hour in as many different product assemblies. Field tests show that installation costs can be cut to as low as ½-cent per screw.



Setomatic consists of two basic units:

1. The screw-supply system which picks up screws from a supply hopper, orients them and feeds them into a driver-feed tube.

2. The drive mechanism which picks up the screws from the feed tube, inserts them into tapped holes and tightens them to a pre-set, closely controlled torque.

Standard Pressed Steel Co., Jenkintown, Pa.

Use postpaid card. Circle No. 121

AUTOMATIC ASSEMBLY OF ELECTRICAL CONTACTS

A new line of automatic machines now permit production line methods for setting electrical contacts made from precious metals. Machines are for entirely new head and anvil assemblies for setting single-, multi-, and double-headed contacts.

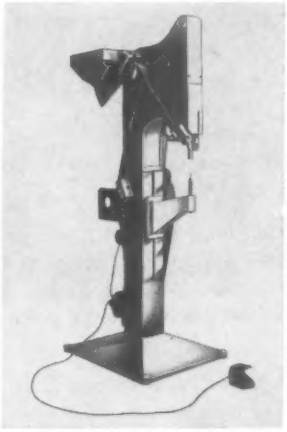
Automatic hopper feed allows the operator to load bulk quantities of contacts in the machine. No further manual handing is required. The contacts are carried automatically from the hopper through a track to the setting position.

Typical of these machines is the model for double-heading. Using precision contacts, the machine will stake and form the second head in one blow without blade distortion. With this and other machines in the line, over-all thickness of the contact assembly can be held to precision tolerance.

Judson L. Thomson Mfg. Co., Waltham, Mass.

Use postpaid card. Circle No. 122

MACHINE SETS L-O-N-G RIVETS UP TO 2-⅜"



A machine has been designed to handle and set long rivets in metal furniture, television antennas, industrial wheels and casters, toys, etc.

Model 423 will set tubular and semi-tubular rivets up to ¼" in diameter and 2⅜" long. Smooth, continuous feed is insured by a blade-type hopper of advanced design that is both rugged and compact. Rivets are fed automatically to the work when the foot or palm switch controlling the single revolution clutch is pressed.

A toggle-action mechanism that provides positive setting action is standard in the design. The motor is a 1/3 hp, 60 cycle, 110 volt, a-c model that operates at 1140 rpm.

Of necessity, the machine is large and rugged. It is, of course, pedestal mounted with motor and flywheel set low to increase stability. Throat depth is 12", stroke is 5½". Over-all height is 78⅜", with the anvil bracket being 44" off the floor.

Milford Rivet & Machine Co., Milford, Conn.

Use postpaid card. Circle No. 123

Need a Fastener that Hasn't Been Invented?

Chances are you'll pay top price for it. But by following these six rules you can avoid the high cost of becoming an inventor!*

IT'S natural to assume that, after designing a piece of equipment, you'll have no trouble finding standard fasteners to fit it. Usually such fasteners will be readily available. But what happens when you find yourself with a finished design that doesn't lend itself to any known fastening method?

The most expensive thing you can do at this point is to start inventing fasteners. Valuable man hours go into research, design, prototypes and testing. And unless you can make these fasteners in very large quantities the unit cost will be high, particularly if tooling is necessary.

Now, here are six tips that can get you out of trouble—and keep you out:

1. Remember—not all standard specialty fasteners are listed in fastener manufacturers' catalogs. The fastener company that serves you is probably tooled up for hundreds of non-standard devices, designed and produced to solve problems like yours for other customers. Maybe one would meet your requirements. You'd save the development and tooling charges.

2. There may be a stock fastener available for this job that hasn't come to your attention. Discuss the problem with the fastener manufacturer. If he has nothing in stock, he may be able to modify one of his standard devices at very nominal extra cost.

3. Don't overlook free professional help! Your fastener manufacturer will be glad to offer advice and design service—he does it for everyone else. Unload the problem on him, and let his experience work for you.

But you'll save money if you avoid specifying the fastener that hasn't been invented. By following the next three rules you can usually keep from reaching the point where a non-standard device might be necessary.

4. Go into the fastening problem during the early stages of design. Design your closures with standard fastenings in mind. You won't be left with the costly choice of inventing a fastener or redesigning your product.

5. Keep a complete file of fastener manufacturers' catalogs. Your product designers seldom are fastener specialists too, but they can have complete information available when they need it—at the design level.

6. Work closely with the Fastener Sales Engineer who calls on you. He's trained and paid to help solve your problems. Take full advantage of this service.

Whether you need a standard specialty fastener or the one that hasn't been invented, Southco is well qualified to invite your inquiries. There's no obligation on your part. It's part of our business to offer free consultation at the design or production levels, on items of your own product line, or on those involving military specifications.

Send today for our forty-four page Fastener Handbook No. 8, just printed. Write to Southco Division, South Chester Corporation, 257 Industrial Highway, Lester, Pa.

** Reprints of this page are available on request.*

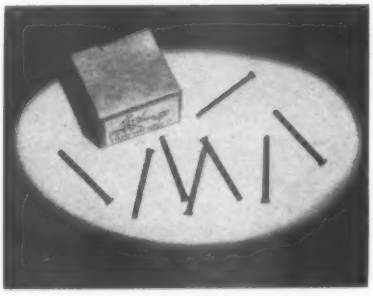
SOUTHCO FASTENERS

© 1958

Use postpaid card. Circle No. 256

WHAT'S NEW IN FASTENERS

For further information on any of the fasteners listed here, use the handy postpaid card opposite page 72.



(See 126)

(See 124)

(See 125)

(See 127)

RETAINING RINGS RESIST THRUST AND VIBRATION

Retaining rings said to resist considerable thrust and vibration without displacement are being manufactured as Industrial Series 2000. The rings provide shoulders on grooved shafts to position pins, shafts, bearings, bushings, gears and other product components. Product weight and bulk are reduced by eliminating cotter pins, screw-fastened collars, machined shoulders, nut and washer assemblies and other complicated fasteners. Radially applied, the crescent-type rings are suited to applications which do not require a large shoulder, where space is limited, or where axial access is difficult or impossible.

When necessary, the rings may be removed and reused without special tools or loss of resiliency.

The rings are available in 25 sizes to fit shafts from ⅛" to 2" in diameter; in carbon spring steel, stainless steel, phosphor bronze and beryllium copper. Available finishes include oil-dip, black oxide, Parkolac-black, nickel plating, and cadmium or zinc plating in bright, dichromate dip, plain or olive-drab iridite dip.

Industrial Retaining Ring Co., 57 Cordier St., Irvington 11, N.J.

Use postpaid card. Circle No. 124

VERSATILE SPRING WASHER IS NON-SLIP, VIBRATION

A non-slip, anti-vibration spring washer is being marketed for routine use in automotive, electronic, home appliance, aviation and associated industries.

The Sawtooth Belleville serves in static loads where spring action is required and also provides facility in dynamic loads where the load is being exerted in several directions. The new tooth design is reported to prevent slippage.

It is made of high carbon steel heat treated and also in low carbon steel, stainless steel, bronze and aluminum.

George K. Garrett Co., Inc., Torresdale Ave. at Tolbut St., Philadelphia 36, Pa.

Use postpaid card. Circle No. 125

HEADED PINS ARE HONED

Called Royal Headed Pins, a new line of tool steel pins in over 100 sizes are centerless honed finished, eliminate pickup, and the heads are left soft. The pins are Rockwell tested to C58/60 and feature low cost.

Durant Tool Supply Co., Providence 5, R.I.

Use postpaid card. Circle No. 126

TUBING JOINT CONNECTS DISSIMILAR METALS

An all-metal joint for connecting tubing and ducting of dissimilar metals subject to extreme temperatures is being produced. The Marman Conoseal joint has a compression type metal gasket claiming flexibility and sealing formerly possible only with organic seals.

It is said to assure fluid line seal from 300-1600° F, at pressures to 6000 psig, and withstands axial deflections as high as 1/16" without sacrifice of sealing qualities.

Designed primarily for the aircraft and guided missiles fields, it is recommended for high pressure pneumatic, liquid oxygen, hydraulic, exhaust and dual systems. It is available in low, medium and high operating ranges. Standard sizes: 1" to 12" O.D. tube.

Marman Div., Aeroquip Corp., 11214 Exposition Blvd., Los Angeles 64, Calif.

Use postpaid card. Circle No. 127

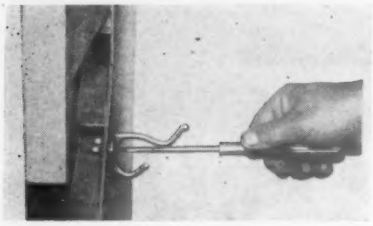
SELF-LOCKING INSERT ELIMINATES THREADING

Successfully tested in the textile industry, a self-locking insert eliminates threading in thin and heavy materials. The one-piece, all-metal insert comes threaded or in plain bore with resilient segments which provide a spring grip for fast, sensitive, shock and vibration resistant, self-locking adjustments for screws, pins, shafts, etc. Perma-Lock acts as brake for cylindrical, axial and slide movements.

J. B. Plevyak Mfg. Co., 19 Jefferson St., Newton, N.J.

Use postpaid card. Circle No. 128

WALL ANCHOR WORKS IN SMALL SPACES



The Shorty Wing-Ding is a new hollow wall anchor designed for use where clearance between partitions is small.

The anchor is used in fastening fixtures to plaster board or other wall paneling that has been secured to ¾-inch burring strips fastened to old wall surfaces. The limited clearance afforded by the furring strip makes use of conventional wall anchors impossible.

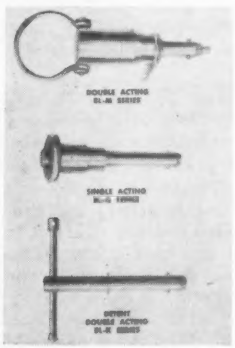
Another application of the anchor is in mounting fixtures on the hollow core doors that are popular in new home construction and existing home modernization.

One inch in length, the anchor requires a ¼" hole and will work on panels with thicknesses from 1/16" to 3/8". Tested for weights up to 200 pounds, the Shorty needs as little as 3/4" clearance between partitions.

Diamond Expansion Bolt Co., Inc., Garwood, N.J.

Use postpaid card. Circle No. 129

QUICK-RELEASING PIN SERIES OFFERS NEW DESIGN



New design features plus a system of three individual type materials within the same pin diameter are offered in a new Ball-Lok quick releasing pin series.

In operation, when the pin is inserted or in a locked position, the balls protrude beyond the body assembly where they are firmly locked by the full diameter of the spring loaded plunger. To release the pin, pushing the button or pulling the head, depending on the model, the balls sink below the diameter of the body assembly, leaving the pin free to be removed.

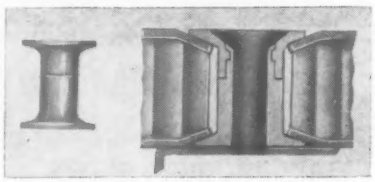
For commercial applications, where shear qualities are not a factor, pins are produced from non-heat threaded B-1113 steel screw stock. Pins are also available in 4130 Chrome Steel, heat treated to 160,000 to 180,000 psi, meeting military specifications MIL-T-6736A and MIL-S-6758. The Standard Pin finish is Cadmium Plated per QQ-P-R16A.

For ultimate strength, pins are made of 17-4 stainless steel, heat treated to 180,000 to 210,000 psi, which meets AMS-5643C. These pins are passivated per QQ-S-770A.

D. W. Price Corp., 11161 West Pico Blvd., Los Angeles 64, Calif.

Use postpaid card. Circle No. 130

HONEYCOMB SPACER PARTS FIT WITHOUT SELECTION



Installation is said to be swift for a two-piece honeycomb spacer that does not depend on the selective fit of parts for assembly.

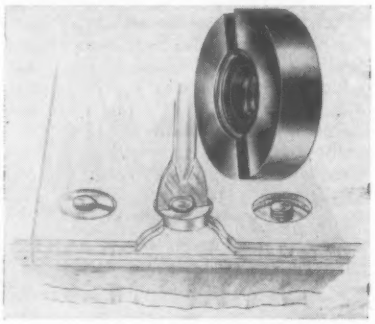
The SM Series uses ordinary drill sizes for the installation hole in the sandwich structure. The spacer is placed in the hole and the grommet visually aligned and mating parts set. When installed, the grommet is locked by the flaring over of the lip at the top of the spacer into the locking groove of the grommet. The fastener may be removed by drilling out this swaged over flange.

The spacer is interchangeable with other honeycomb spacer installations.

Shur-Lok Corp., 879 South East St., Anaheim, Calif., Attn: D. B. Kreider.

Use postpaid card. Circle No. 131

FLUSH MOUNTED PANEL NUT



A self-locking nut is designed to be mounted flush with interior wooden panels of trucks and railroad freight cars.

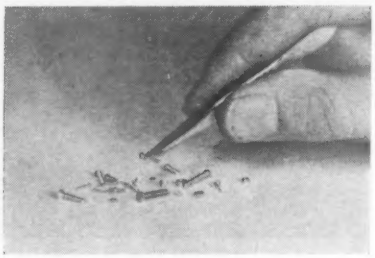
ESNA type 3017 is made of carbon steel, 1" in diameter and .265" thick and is available in ⅜-16 thread size.

Installation or removal of the .125" slot-faced nut can be made with a standard double-bladed screw driver. The nylon locking insert is said to keep the nut from loosening under vibration or despite loss of bolt tension due to shrinkage or compression of the panels.

Elastic Stop Nut Corp. of America, Union, N.J.

Use postpaid card. Circle No. 132

MINIATURE BRASS SCREW .021" IN DIAMETER

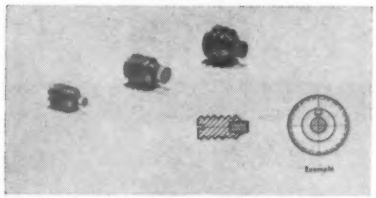


Still a smaller screw has been added to the miniature fastening line of J. I. Morris Company. The size is 0000-160 with a body diameter of .021" and is available in brass with flat and oval fillister heads in 1/16", 3/32" and 1/8" lengths.

J. I. Morris Co., Southbridge, Mass.

Use postpaid card. Circle No. 133

SET SCREWS EMPLOY NYLON INSERT GRIP



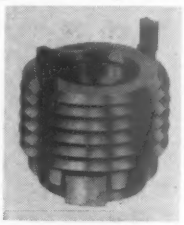
Set screws designed to eliminate the necessity of split hub gears and clamps are reported to offer savings in design costs. No-Mar screws permit positive locking with nylon inserts taking the shape of the holding member and permiting the removal of all parts without burrs or marks.

PIC Design Corp., 477 Atlantic Ave., East Rockaway, N.Y.

Use postpaid card. Circle No. 134

INSERT COMPENSATES FOR BOLT HOLE ERRORS

A self-aligning internally-threaded insert has been designed to compensate for misalignment of bolt holes in mating parts.



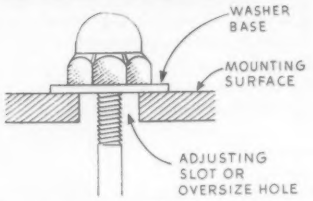
KeeNserts, supplied as one piece units, are externally threaded to provide maximum resistance against pull out. Positive mechanical resistance to rotation is provided by the KeeNsert Kees, which are tightly fastened in the inserts and are pressed into the base material with a small punch and hammer or installation tool.

The insert is available with an internal thread lock. Prevailing torque is reported to be consistent after repeated installations and removals of the bolt.

Newton Insert Co., 6500 Avalon Blvd., Los Angeles 3, Calif.

Use postpaid card. Circle No. 135

CAP NUT INCORPORATES INTEGRAL WASHER BASE



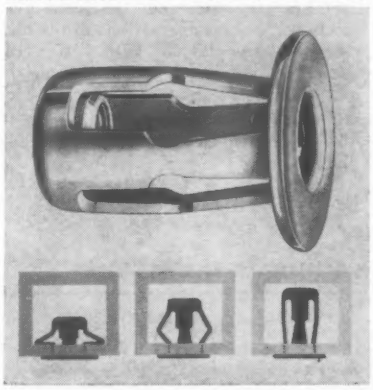
Die cast zinc alloy cap nuts with integral washer bases are claimed by Gries Reproducer Corp. to offer:

1) Elimination of the need for separate washers.
2) Greater seating area providing firmer grip on surfaces.
3) The allowing of production leeway, by making holes oversize, or incorporating special slots for adjustment of different sections.
4) Utility on soft surfaces as plastic, wood, composition board.
5) Simplified assembly and reduced production costs.
6) Durability, rust proofness and corrosion resistance.

Gries Reproducer Corp., 400 Beechwood Ave., New Bochelle, N.Y.

Use postpaid card. Circle No. 136

BLIND FASTENER GRIPS MATERIAL 0" TO 3/8" THICK



A blind fastener with threads which reportedly grip securely any kind of material from 0" to 3/8" thick has been called the Jack Nut. It is self-adjusting to grip evenly on rough and curved as well as smooth surfaces.

The nuts can be used as rivets and/or blind fasteners in expansion space as small as 3/8". They provide nutplates for attachment screws. Anchorage is permanent, permitting screws to be removed and replaced. Jack Nuts made a vibration-proof assembly with weight-carrying capacity limited in most cases only by the strength of the material in which used.

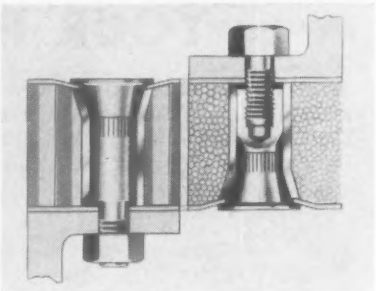
Allowing holes to be fashioned before, during or after fabrication, the nuts do not require special holes and hole size is not critical.

They are available in two lengths: short for thicknesses from 0" to 3/16" and long for 0" to 3/8". They are installed with a screwdriver and any US standard 6-32, 10-24 or 1/4"-20 screw.

Molly Corp., Reading, Pa.

Use postpaid card. Circle No. 137

PANEL FASTENER FOR QUICK INSTALLATION



A structural-type fastener has been designed to provide additional strength for a variety of sandwich-type panels now in broad use in industry. It claims low installation cost because no special tools or skills are required.

The Delron fastener consists of two pre-assembled parts: the body and expanding sleeve. The body section comes in many forms, including internal threaded, threaded stud, male rivet and thru-bolt types. Flush applications with minimum dimple are assured on both skins through die action of body and sleeve.

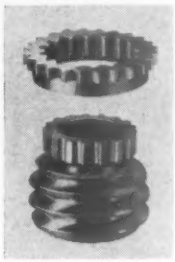
High column strength of fastener prevents crushing of panels, and maximum shear strength is guaranteed by distribution of loads to both skins. High tension pull out values are insured by a positive skin gripping feature. The fastener requires no filler to hold in panel, resulting in lightweight installation.

The Delron Co., Inc., 5224 Southern Ave., South Gate, Calif., Attn.: Ray J. Schwab.

Use postpaid card. Circle No. 138

STUDS AND INSERTS SEAL PRESSURE FLUID SYSTEMS

A series of studs and inserts which seal component and system parts against pressures up to 3000 psi has been designed by Rosan, Inc., for use in pressurized fluid systems.



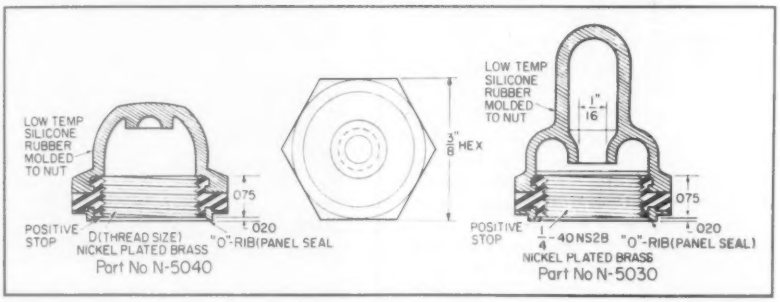
Each stud and insert has a collar above the top of the threads and an annular recess below where the packing ring is located. When the fastener is screwed into a threaded hole that is counterbored, the packing ring is situated between the bottom of the collar and the bottom of the counterbore. Any leakage that may escape the threads is stopped by the seal.

Vibration has caused difficulty in the design of positively locking fasteners. The technique of locking threaded fasteners has been adapted to the fluid studs and inserts to avoid loosening. A second collar, above the first, is radially serrated around the outer edge. When the fastener is screwed into place, a lock ring, also radially serrated, around its inner and outer edge, is placed over the fastener. Inner serrations of the lock ring are thus aligned with the serrations of the fastener collar. When the lock ring is pressed into a counterbored section at the top of the hole, the aligned collar and lock ring serrations mesh.

Rosan, Inc., 2901 West Coast Hwy., Newport Beach, Calif.

Use postpaid card. Circle No. 139

HIGH PRESSURE SEALS FOR SUB-MINIATURE SWITCHES



A series of one piece high pressure seals intended for use on commercial and military subminiature push-button and toggle switches has been introduced.

The N-5000 Hexseals incorporate a rigid hexagonal nut, which replaces the conventional mounting lock-nut, and serves as both seal and lock-nut. High pressure sealing is maintained by a gasket rib which seats firmly against the mounting panel surface to keep out moisture, water, dust or combustible vapors.

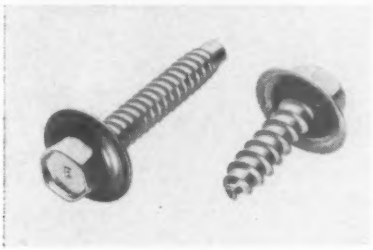
Seals are made by bonding silicone rubber, chemically and mechanically, to a hexagonal nut. They remain unaffected by salt water, acids and ozone; are useful over the temperature range -160°F to 500°F; will hold a pressure of 500 psi externally and 15 psi internally.

Two types are available. Series N-5040 are intended for installation on push-button switches, Series N-5030 are designed for toggle switches. Both are furnished in three standard sizes. The boots meet the weather and vibration requirements of MIL-E-5272A and MIL-B-19257 (Ships) Amendment 2. They can be stored in any climate for more than 25 years without deterioration or aging.

Automatic & Precision Mfg. Co., 252 Hawthorne Ave., Yonkers, N.Y.

Use postpaid card. Circle No. 140

FASTENER SEAL AVOIDS INSTALLATION TEARING



Said to overcome a common problem of sealing fasteners—subjecting the seal to twisting and tearing action during installation because the washer does not turn when screw or bolt is tightened—the Spin-Seal provides secure triple seal on irregular, corrugated, curved and flat surfaces.

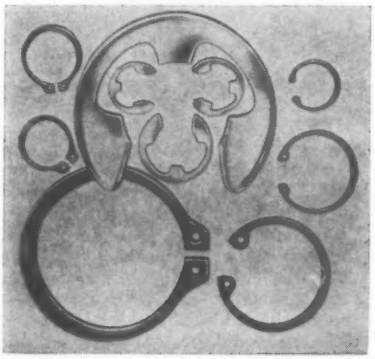
The screw furnishes secure weather seal when installed in corrugated sheet metal siding. It consists of a spring type hardened washer with a permanent flowed-in gasket sealant which is preassembled to any type of stand machine screw, cap screw or bolt. Screw sizes No. 6 to ½" in carbon or stainless steel are available.

It can be installed by hand or power wrench, can withstand service temperatures from minus 100° F. to plus 250° F., and will not split or ozone-check under pressure. Standard compound seals against water and many dilute acids; another compound for oils is available. Flowed-in gasket sealant is a poly-vinyl chloride base compound that is a plastic material.

Russell, Burdsall & Ward Bolt and Nut Co., 100 Midland Ave., Port Chester, N.Y.

Use postpaid card. Circle No. 141

RETAINING RINGS UP TO 2" MADE IN NEW RAMSEY PLANT



First new product of Ramsey's multi-million dollar St. Louis plant is the Circolox retaining ring series, in sizes up to 2" and in a variety of metals. All conform to required national standards.

The three types: 1) internal ring which has the lugs on the inside, 2) external ring with lugs on the outside, 3) standarized "E" ring for shoulders on small shafts.

Ramsey Corp., St. Louis 8, Mo.

Use postpaid card. Circle No. 142

HANDY BLIND BOLT KIT IS COMPACT, COMPLETE

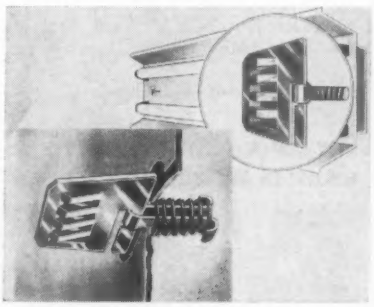
For use where power installation tools are not normally available, a blind bolt kit has been developed to simplify the repair of aircraft or missile structures, particularly where fastener accessibility problems are encountered.

The Blind Bolt Fix Kit FK-110 contains hand installation tools with spare mandrels and packages of stainless steel blind bolts and nuts. Diameters range from 5/32" through 3/8" and in grip lengths from 1/8" extending to 1" in larger diameters. The aluminum case and kit weighs 15 lbs.

Hi-Shear Rivet Tool Co., 2600 W. 27th St., Torrance, Calif.

Use postpaid card. Circle No. 143

QUICK FASTENER FOR LIGHTING REFLECTORS



Lite-Lok, a fastener designed to provide easy attachment and removal of sheet metal parts, is installed without special tools, and accommodates thicknesses up to a total of 5/32".

Consisting of tab, yoke and spring, the fastener is installed by slipping the spring over the yoke, inserting the yoke through a hole in the frame, and sliding the table into the yoke where it is retained by a notched seat. The removable sheet metal part is slotted. The fastener tab passes through this slot, is turned 90°, and flipped flat against the sheet. It is then out of the way and locked securely against accidental release. Decorative serrations on the tab permit easy gripping to release for removal, which is the reverse of the above operation.

Southco Div., South Chester Corp., Lester, Pa.

Use postpaid card. Circle No. 144

LOCKNUT HANDY FOR BLIND APPLICATIONS

A tempered spring steel self-retaining lock nut has been designed as a captive nut for No. 8-32 screws in blind applications.

Flared sides push into and retain the nut in the slot or cavity.

The shape is suited to fast, low-cost hopper feeding or automated insertion into cavities. The nut has the Palnut self-locking thread form which exerts a spring grip on the threads to resist loosening under vibration. Tightening torque of 10 inch pounds assures maximum locking action. Measuring .140" in over-all height, the nut is assembled in a slot .370" ±.005" wide. Stocked in zinc peen finish and also available in cadmium or plain finish.

The Palnut Co., 61 Glen Road, Mountainside, N.J.

Use postpaid Card. Circle No. 45

⅛" NPT PRESSURE SNUBBERS MEET DEMAND

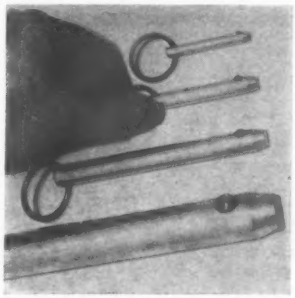
To meet demand for small pressure snubbers by aircraft, automotive and refrigeration industries, Chemiquip has now developed a unit with ⅛" NPT male and female pipe connections.

The ⅛" NPT pressure snubbers are fabricated of brass, aluminum or stainless steel for maximum corrosion resistance; and in three porosities, for oil, water and gases, including steam. The pore openings of the calibrated insert of the porous metal tend to prevent plugging or clogging.

Chemiquip Co., 460 West Broadway, New York 12, N.Y.

Use postpaid card. Circle No. 46

QUICK RELEASE PINS FEATURE SHEAR STRENGTH



A line of quick release dentent pins features both high shear strength and surface hardness. The self-retaining steel pins have been developed for fast assembly, disassembly or quick removal.

Faspins are available in sizes of ¼" to 1" and lengths of 3/10" through 8" and to meet a wide range of military and commerical specifications.

Aerofast, P.O. Box 324, Wheaton, Ill.

Use postpaid card. Circle No. 47

FASTENER PROBLEMS?

Contact

SCOVILL

Cold headed Copper Stud

We will be glad to work out your requirements with you. There is a Scovill Industrial Fastener Sales representative near you. Send, now, for "A Guide to the Profitable Use of Cold Heading." No obligation.

Special Cold Headed Parts
Phillips Recessed Head Screws
Clutch Recessed Head Screws
Washer Screw Assemblies (Sems)
Tapping Screws
Standard Machine Screws

SCOVILL | **INDUSTRIAL FASTENER SALES**
Waterville Division
Waterville 14, Connecticut

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USEFUL LITERATURE

To receive your copy of any literature reviewed here, use the postpaid card opposite page 72.

RIVET APPLICATION

Rivets are covered in a 36-page "Fastener Fact File." Description, function, dimensional data, design factors and application are dealt with for each of the semi-tubular, deep-drilled, bifurcated (split), shouldered and outside prong type rivets. Other sections include useful tables of number and letter drills, decimal equivalents, U.S. thread and machine screw taps; purchase information; specifications and photos of 20 rivet-setting machine styles; standards chart for semi-tubular rivets; metals and finishes available, J. L. Thomson Mfg. Co., Waltham 54, Mass.

Use postpaid card. Circle No. 1

SILVER ALLOY BRAZING

Good brazing practice is demonstrated in Brazing News No. 79, a compact two-color bulletin. It also points out that silver alloy brazing offers great flexibility: eight basic heating methods, 36 silver alloys, a host of dissimilar metals that can be joined at unparalleled speeds. Handy & Harman, 82 Fulton St., New York 38, N.Y.

Use postpaid card. Circle No. 2

FASTENER ANALYSIS SERVICE

Better assembly at lower cost is the product of a unique Fastener Analysis Service outlined in a two-color bulletin. Engineers present "before and after" sketches, sample parts, blueprints, cost analysis data and design suggestions. Photos also show applications of the manufacturer's self-retaining "U" type Speed Nut. Tinnerman Products, Inc., Cleveland 1, Ohio.

Use postpaid card. Circle No. 3

SPOTWELD NUT

The XN spotweld nut, announced in a colorful flyer, offers optimum welds, production speed and flexibility and is designed for use with light, portable welding equipment. Seven stock sizes and dimensions are given and a chart lists recommended settings for welding the nuts to sheets from .025" to .187" thick. A recessed target welding area which guides the electrode tip to perfect alignment and a precision pilot which simplifies feeding are illustrated. A sample nut is included. The Ohio Nut & Bolt Co., 33 First Ave., Berea, Ohio.

Use postpaid card. Circle No. 4

POWER SCREWDRIVER

How the problem of holding a constant torque was solved is told in a three-color brochure introducing the Model "U" power screwdriver. The assembly machine is adjustable from a minimum 15 inch lbs. to a maximum of 120 inch lbs., holding tolerances of between plus or minus 2 to 6 inch lbs. Detroit Power Screwdriver Co., 2801 W. Fort St., Detroit 16, Mich.

Use postpaid card. Circle No. 5

LIQUID LOCK AND SEALANT

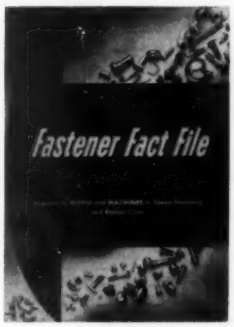
Loctite, a liquid for threaded fasteners and a sealant for joints and pores in metals, is treated in folder and accompanying magazine article reprints. Designed for use under shearing—rather than tensile — stresses, the automatically-hardening liquid is used on set screws, studs, non-seated adjustment screws and aluminum fasteners. American Sealants Co., 117 Woodbine St., Hartford 6, Conn.

Use postpaid card. Circle No. 6

METAL STITCHING

"Metal Stitching, A New Idea in Fastening," gives detailed information on stitching metal to metal or metal to non-metallic materials. The booklet illustrates several typical applications, some of which have increased production up to seven times and cut material costs by 66 percent. Acme Steel Co., 135th St. and Perry Ave., Chicago 27, Ill.

Use postpaid card. Circle No. 7



(See 1)

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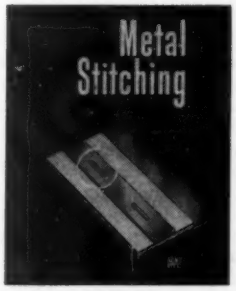


(See 7)

WIRE-WRAP TOOLS

Solderless, metal-to-metal connections are possible with Keller Wire-Wrap tools described in colorful brochure. Five tools displayed with typical applications in communications and electronics. Close terminal spacing, high pressure contact, gas-tightness and no embrittlement or stress concentration emphasized. (Bulletin No. 14-1 available.) An automatic component assembly machine is also introduced. It places and wraps up to 2000 axial lead components an hour. Gardner-Denver Co., Quincy, Ill.

Use postpaid card. Circle No. 8

SELF-LOCKING FASTENERS

Lock Nuts and fasteners are treated in a 28-page catalog which includes product descriptions, illustrations, dimensions, screw tension pounds, materials, finishes and typical applications pertaining to each type. Lock Nuts available are Regular, Washer, Acorn Type C and CK, Wing, Tension, Inverted and Conduit Lock; fasteners, Flat Type H, Acorn C and CK, Type W, Self-Threading Nuts, Shield Can, Coil Tube and Rectifier Mounting Clips. Details are given on design and locking principle, high-speed wrenches and applicators, assembly and cost data. The Palnut Co., 61 Glen Rd., Mountainside, N.J.

Use postpaid card. Circle No. 9

SOCKETS—IMPACT, DRIVE

Fast lead and surface drive sockets for hex nuts and cap screws is the subject of a seven-page catalog. Fast lead impact sockets are used with power tools in applications with 12-point (double hex) sockets. The broached openings provide complete engagement of socket and nut upon contact and make possible the running down of a series of nuts without stopping the tool for each nut. Surface drive sockets are used on multiple-unit power tool applications where perfect alignment of tool and nuts or bolts is not always possible. Apex Machine and Tool Co., 1025 S. Patterson Blvd., Dayton 2, Ohio.

Use postpaid card. Circle No. 10

STRESS PANEL FASTENER

Two technical bulletins contain complete engineering specifications and qualification test data for the Waldes QAF quick-action stressed panel fastener. An illustrated brochure describes the fastener, which is designed for use on structural load-carrying panels in aircraft, guided missiles and other applications where quick access to service areas is required. Nine pages are devoted to the results of tests. NAS Qualification Tests, Sonntag Shear Fatigue Test, Calidyne "Vibration Sweep" Evaluation. Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N.Y. Attn.: Special Products Div.

Use postpaid card. Circle No. 11

QUICK-RELEASING PINS

Safety and quick-realeasing action are emphasized in a three-color brochure presenting the Series 5440 Pip Pins. Available in three head type styles, the pin spindle moves when control button (in head of pin) is intentionally depressed, permitting protruding steel balls to recede flush with outer surface of pin body for easy insertion or removal of pin. A dimensional data chart aids in selecting styles and sizes and photos present typical applications. Aviation Developments Inc., 210 South Victory Blvd., Burbank, Calif.

Use postpaid card. Circle No. 12

DOUBLE STROKE HEADER

All phases of the operation of the Hi-Pro Header are described in detailed folder: feed, cutoff, heading unit, knockout, tools, motor drive and lubrication. The solid die double stroke crank header offers low maintenance with high operating speed to the cold heading production of screw or rivet blanks from coils of wire. Specifications and standard tool sizes are charted and photos of the available models are shown. Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

Use postpaid card. Circle No. 13

RIVETS AND SETTERS

Rivets are defined by type and cataloged for quick pricing in a 15-page publication. Tubular, split and shoulder rivets are standards available and each style is pictured in actual size above the pertinent dimensional figures. Five pages devoted to a wide range of automatic setters: automatic single setters, foot power single setters, automatic double setters with adjustable centers, multiple setters with fixed centers. Chicago Rivet & Machine Co., 950 S. 25th Ave., Bellwood, Ill.

Use postpaid card. Circle No. 14

PLUG NUTS

Interesting facts about plug nuts—their application and advantages—are brought out in a four-page bulletin. A dimensional chart is accompanied by illustrations showing step-by-step installation. Plug nuts can be hopper fed, can be pressed in more than one at a time, and used with spring-loaded locating pilots. They are applicable in any thickness of material down to .030" and in any tap size from No. 4 to ¾". Lamson & Sessions Co., 1971 W. 85th St., Cleveland 2, Ohio.

Use postpaid card. Circle No. 15

HEAD CAP SCREWS

An eight-page technical aid entitled "Guide for Design and Assembly of Mac-it Head Cap Screw" is packed with torque-tension data on the tightening torque required to produce a desired screw tension for all standard sizes of Mac-it socket head cap screws. Screw design considerations are emphasized and torque-tension terms are explained in detail. The guide also includes extensive screw data—physical characteristics, specifications, dimensions, thread lengths of 14 standard stocked sizes. Mac-it Parts Co., Lancaster, Pa.

Use postpaid card. Circle No. 16

PLASTIC RIVETS

Plastic rivet application is explained in an illustrated brochure. That the one-piece, self-expanding, blind plastic rivets fasten any material from paperboard to metal is shown in examples of usage. Dimensions, engineering data and hole size recommendations are complete. Fastex, 195 Algonquin Rd., Des Plaines, Ill.

Use postpaid card. Circle No. 17

ADHESIVES, SEALERS

Official U.S. Government specifications for a wide variety of adhesives, coatings and sealers are listed in a 23-page catalog. The catalog lists, in numerical form, military, Army, and Federal specifications, their definitions and the corresponding 3M adhesive, coating or sealer that meets these specifications. Adhesives, Coatings and Sealers Div., Minnesota Mining & Mfg. Co., 423 Piquette Ave., Detroit 2, Mich.

Use postpaid card. Circle No. 18

POWER DRIVING TOOLS

Power tools which automatically control maximum and minimum torque to within 2% of selected figure are featured in a two-color circular. Portable and stationary models drive studs, run nuts and test torque. Specifications listed for 11 models: torque range, type of power, weight, rpm available at spindle, volume of air used per minute. Recent purchasers of Power-Torque tools included. Garvin Brothers, Inc., P.O. Box 536, South Bend, Ind.

Use postpaid card. Circle No. 19

EFFICIENT FASTENER DESIGN

"How to Specify Fasteners and Save," a 12-page brochure, can guide engineers in designing and re-designing headed parts. Quick, worth-while reading. Includes designing for heading (volume, length, tolerances, extrusion, pointing fillets), designing for secondary operations (threading, knurling), materials and their properties, drawings and specifications. Buffalo Bolt Co., North Tonawanda, N.Y.

Use postpaid card. Circle No. 20

SET SCREW USE CHART

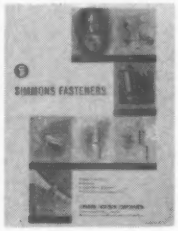
A selector chart showing over 1,001 opportunities for the use of self-locking set screws has been printed to assist engineers and specifiers. The chart indicates the wide scope of combinations of metals, locking actions, drives, points and sizes and suggests uses for particular locking devices covering applications ranging from hardened steel to plastics. Set Screw & Mfg. Co., Bartlett, Ill.

Use postpaid card. Circle No. 21

LOCKING FASTENERS

Fasteners engineered to meet unusual design requirements are presented in a 40-page catalog complete with specifications, drawings, applications and installation information. The new Hinge-Lock, which provides sealing pressure on the hinger line of hinged-cover containers, and Spring-Loaded Link Lock, providing take-up to compensate for set in gasketing, sealing irregularities and mounting inaccuracies, are fully described. The Quick-Lock, Spring-Lock, Roto-Lock, Link-Lock and Dual-Lock are included. Simmons Fastener Corp., North Broadway, Albany 1, N.Y.

Use postpaid card. Circle No. 22



COLD-HEADED FASTENERS

Cold-headed fasteners—rivets, nails, threaded parts which are job-designed can offer flexibility, speed, strength and appearance, according to this descriptive folder. Custom-fitted fasteners from .024" diameter to 3/8" and from lengths of 1/32" in the small diameter to 7" can be made. John Hassall, Inc., Box 2246, Westbury, L.I., N.Y.

Use postpaid card. Circle No. 23

SEALING WASHER

Sealing process of Bartite washer with measured amount of sealing compound on underside explained in circular. Three-way sealing provided by washer which withstands extremes of temperature, resists air pressure and seals against fluids. L. J. Barwood Manufacturing Co., Inc., Everett 49, Mass.

Use postpaid card. Circle No. 24

CAP SCREW AND BOLT TEST

"Static and dynamic properties of 1¼" hexagon head cap screws and bolts processed by different manufacturing techniques," is the title of a technical report printed in large-type loose-leaf form. The test was made by Standard Pressed Steel Laboratories and compared machining complete from bar stock, hot heading, cutting threads and cold forging and rolling threads. Graphs and illustrations are included. Cleveland Cap Screw Co., 4444 Lee Rd., Cleveland 28, Ohio.

Use postpaid card. Circle No. 25

INDUSTRY MAKES NEWS

New SPS Western plant houses laboratory for study of fastener problems.

Inert gas shielded arc welding being used to fabricate stainless steel hood for AEC exhibit at "Atoms for Peace" conference in Geneva, Switzerland.

LABORATORY STUDIES FASTENING PROBLEMS

The third Screw Thread Metrology Laboratory for the study of fastener assembly problems and size-control of threaded parts was opened in the newly-constructed Standard Pressed Steel Co. plant in Santa Ana, Calif. Other facilities are located in Jenkintown, Pa., and Cleveland, Ohio.

More than $300,000 worth of screw measuring equipment is at industry disposal. Some of the machines will check critical thread dimensions to the nearest millionth of an inch. The labs will advise and aid fastener users in setting up reliable inspection gaging systems.

The new factory is producing Cooper aircraft bolts and steel shop and office equipment.

U.N. EXHIBIT USES ARC WELDED EQUIPMENT

Inert gas-shielded arc welding was used to fabricate all equipment in the Atomic Energy Commission's radiochemical tracer laboratory exhibit at the Second United Nations International Conference on Peaceful Uses of Atomic Energy in Geneva, Switzerland.

Loaned by S. Blickman, Inc., the equipment was predominantly stainless steel for maximum strength and easy decontamination. All welds were ground down to the metal surface and polished to eliminate microscopic pores that could hold hazardous radioactive materials.

MISSOURI PLANT TO ASSEMBLE PLYMOUTHS

Chrysler Corporation's new multi-million dollar automobile assembly plant, 20 miles southwest of St. Louis, is nearing completion.

The Valley Park factory, which will supply Plymouths to some 1400 southern and southwestern dealers, will employ 3500 when in full production.

Use of precast concrete panels enables crews to apply siding to the building nearly 10 tons at a time. The panels are made right on the job site. Steel plates are embedded in the big 15′ x 13-½′ panels as they are cast. Heavy duty cranes lift and guide the panels into position. The steel plates which are built into the panel are then welded to

the framework of the building.

Other facilities include an office building fronting U.S. Route 66, power house, 160-foot high water tower, storing and shipping area for 2500 new cars and a parking lot.

CHICAGO SCREW REALIGNS SALES EXECUTIVES


THOMPSON


NOREN

Standard Screw Co. completed its realignment of executive sales personnel for its Chicago Screw Co. Div. with four appointments. H. T. Thompson, sales manager, standard fastener products; Robert B. Noren, sales manager, special products; E. L. Claussen, vice-president in charge of Stanscrew sales; and R. W. Grady as standard fasteners sales manager, Hartford Machine Screw Div.

HELI-COIL ENGINEERS PROMOTED

Karl H. Epple, Director of Engineering, and Edward W. McLaren, Director of Manufacturing, are recent Heli-Coil Corp. appointments. Epple formerly served as design manager for the Danbury, Conn., firm and developed variations of the basic screw thread insert. McLaren furthered gage and tap production as a plant engineer.

THORESEN NEW HANNIFIN FIELD MANAGER

Thomas H. Thoresen, new Field Sales Manager, will direct all outside sales activities for the Hannifin Co., Des Plaines, Ill. He has been a sales engineer with the firm since 1945 as a production engineer with assignments in South Bend, Ind., Detroit, Mich., as a regional sales manager of the Cleveland area since 1954. He is a member of the American Society of Mechanical Engineers and the American Society of Tool Engineers.

DANIELL MOVES UP IN LOCKHEED CORP.

A 20 year Lockheed veteran, J. R. Daniell, was named manager of the Missile Systems division's Project Systems branch. He was formerly assistant manager of the branch. Daniell was engineering product manager for Lockheed's F-104 jet fighter.

TUBE REDUCING PROMOTES ENGINEERS

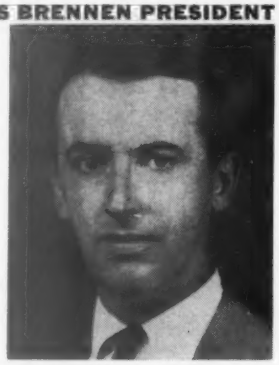
Two engineers became administrators in the Tube Reducting Corp., Wallington, N. J.: Frederick P. Huston, Chief Methods Engineer, and Scott N. Randall, Chief Product Engineer. Huston has been with the company's Navy facility and Randall a plant superintendent.

KOEHLER AIRCRAFT ADVANCES THREE

Three executive promotions within Koehler Aircraft Products Co., Dayton, Ohio, see Donald J. MacFadgen as Vice-President, Engineering; Harold A. Herkenshire, Chief Engineer; George Foster, Vice-President, West Coast operation.

MacFadgen has served as chief engineer for this manufacturer of aircraft fluid control systems since 1955. Herkenshire has functioned as assistant chief engineer and Foster as West Coast design engineer.

ANTI-CORROSIVE ELECTS BRENNEN PRESIDENT



Elected president and chief executive officer of Anti-Corrosive Metal Products Co., Inc., was Bernard T. Brennan, who left his own management consulting company in Chicago to assume control of the fastening firm in Castleton-on-Hudson, N. Y. Two new vice-presidents are Frank Legnard, former treasurer, and Price Berrien, formerly with RB&W Bolt and Nut Co., Donald Whiteman is works manager.

EXECUTIVE ADVANCES AT MIDLAND SCREW

Robert W. Schultz was promoted to Director of Pricing at the Midland Screw Corp. in Chicago, announced President Ray D. Page. Louis Everaert was promoted to Schutz' former position as Personnel Manager.

POLONEC HEADS RB&W BRANCH PLANT

Paul P. Polonec is new plant superintendent at the Rock Falls, Ill., branch of Russell, Burdsall & Ward Bolt and Nut Co. Polonec was former general foreman of the wire mill at the company's Port Chester, N.Y. plant. He has been associated with RB&W for 15 years and is a member of the Wire Association. The announcement was made by Rock Falls plant manager Lambert M. Kaspers. The firm makes industrial fasteners in plants at Rock Falls, Ill., Port Chester, N. Y., and Corapolis, Pa.

NEW DIRECTORS FOR LOCK THREAD

Lock Thread Corp., Detroit, Mich. announced two new directors, Richard Willstatter of New York City and G. Martin Watts of Philadelphia, elected at the annual meeting. Willstatter is with Bache & Co. as metals consultant and Watts is in real estate.

KANSAS GETS MORE INDUSTRIAL GAS

A plant to serve users of industrial gases within a 300 mile radius of Kansas City, Kan., is being constructed by the Air Reduction Sales Co. The plant will have a monthly capacity of 5 million cubic feet of oxygen and will also produce high purity nitrogen. Operation is expected by December.

GRIFFITHS, MYERS GET ACME PROMOTIONS

GRIFFITHS

MYERS

Acme Steel Co., Chicago, Ill., has appointed G. Findley Griffiths as Executive Vice-President, Commerical, and Joseph H. Myers as Vice-President, Marketing. Griffiths, Vice-President of Sales since 1952, will determine sales policies and product prices. Former General Superintendent Myers will coordinate all marketing of the Sales Division.

KAYLOCK FILLS TWO EXECUTIVE POSTS

Moving up to new executive posts in the Kaylock Div. of Kaynar Mfg. Co. are Kenneth D. Davis, director of sales and advertising, and Robert H. Randall, general manager at the Rivera, Calif., facility. Prior to the appointments, Davis had served as regional sales manager and Randall had been in charge of customer service for the aircraft nut firm.

DARBY TO DIRECT TRUARC SALES

James C. Darby is the new general sales manager for the Truarc Retaining Rings Div. of Waldes Kohinoor, Inc., L.I., N.Y. He comes to the firm from the Aircraft Div. of the Townsend Co., Inc., and will handle all sales and marketing of retaining rings, grooving tools, retaining ring pliers, applicators, dispensers and allied products, and the Waldes Positive Lock Fastener for aircraft fuel cells. He was once a senior projects engineer with the Curtiss-Wright Corp., Carlstadt, N. J.

EIA STUDIES RELIABLE CONNECTIONS

Reliable electrical connections will be the theme of the 3rd EIA conference Dec. 2-4 in Dallas, Tex. All interested write R. George Roesch, 1068 S. Clinton St., Syracuse 4, N. Y. Experts in the field will be present.

MURRAY MOVES UP IN BORG-WARNER

John F. Murray has been named chief product engineer for Pesco Products and Wooster Divisions by the Borg-Warner Corp. Formerly manager of product engineering at Pesco Products, Murray's duties are expanded to include co-ordinating engineering activities for research, product engineering and production. He will direct design of fuel booster pumps, fuel gear pumps, hydraulic pumps, electrical and pneumatic equipment.

NASHVILLE, TENN., NEW AWS SECTION

Nashville, Tenn., has become the 81st section of the American Welding Society and the fourth in the state. Officers are Chairman—Burton C. Haworth, E. I. du Pont de Nemours & Co.; Vice-Chairman—John L. Bevill, Kerrigan Iron Works; Secretary—Robert W. Lidle, Ford Glass Plant; Treasurer—W. E. Moran, Nashville Bridge Co., Membership—W. Michael Belew, Eutectic Welding Alloys Corp.; Program—Russell Staub, Industrial Electric Co.; Executive Committee—Jules Durham, American Bureau of Shipping; Miller C. Minton, Nashville Bridge Co.; J. McCann, McCann Steel Co.

1959 TOP WELDING CONVENTION

Space reservations received by the American Welding Society for their 1959 Welding Show in Chicago indicate one of the biggest conventions in history.

The 40th annual conference will feature new products and technical papers on pressure vessels; pipe lines; machinery design; structures; automation; welding of castings and composite structures; dissimilar metals; aluminum, zirconium, titanium, molybdenum and like metals; soldering; adhesive bonding and the welding of plastics and practical "how to do it" applications; fabrication and maintenance of equipment for radioactive applications.

Technical meetings will be held Apr. 6-10 in the Hotel Sherman and the Welding Show, Apr. 7-9 at the International Amphitheatre.

ERDMAN HEADS KETT RESEARCH

Frank H. Erdman has been named President of Kett Technical Center, Inc., research center of U. S. Industries, Inc., in Pompano Beach, Fla. Erdman comes from extensive background in the aircraft field and had done extensive work with propulsion devices while Vice-President in charge of Administration of Experiment, Inc., in Richmond, Va. Kett technical center conducts research for U.S. Industries, military and commercial organizations.

CHRYSLER CONSOLIDATES PURCHASING

Realignment of Chrysler Corporation's purchasing activities to bring previous divisional buying functions within the corporate purchasing department resulted in six key appointments to the corporate purchasing staff. S. M. Baltzly has been named director of supplier relations; W. G. Embury, purchasing, non-production materials; F. O. Dutton, purchasing, body parts; J. C. Poyner, purchasing, raw materials; D. L. Shakotko, paint and trim; J. W. Snyder, purchasing, chassis parts. Prior to this, Baltzy had been with Chrysler; Embury, Plymouth; Dutton, corporate purchasing dept.; Poyner, supplier relations; Shakotko, Dodge; Snyder, corporate purchasing dept.

WALDEN DIRECTS RAMSEY RING DIVISION

Ramsey Corp. of St. Louis announced that Kenneth T. Walden is new head of its Retaining Ring Division, after joining the company in 1957 and serving in the Service Sales Division. He will coordinate sales, advertising, sales promotion and market planning. He previously served nine years with the York Corporation in engineering and sales—two of which were spent in Hong Kong as Far Eastern Representative.

PHEOLL ADVANCES SALES PERSONNEL

Pheoll Mfg. Co., Chicago, announced two advancements: Frank Mears as Consumer Sales Manager of the Industrial Fasterner Div. and Douglas O. Bielenberg as Distributor Sales Manager. Mears, who has been with the firm 16 years, served recently in the Indianapolis area. Bielenberg joins the home office after handling sales in Milwaukee.

UNISEAL NOW NAMED AERO-STAT

A change in company name was announced by J. A. Iaia, President of the Aero-Stat Co., Los Angeles, Calif., formerly the Uniseal Co., manufacturers of self-sealing fasteners. Iaia also disclosed that the firm would soon produce access doors for aircraft.

Don't Overlook These Articles

FEATURES

REPORTS FROM THE FIELD

ASSEMBLY IDEAS

Index to advertisers

THE MEETING WILL COME TO ORDER

LOOK you at the committee members! This one writes his name in fancy script on the pad, that one doodles leaning pagodas, the other gnaws his pencil like a beaver, one strains to read the Organization Chart on the far wall, another—with hands folded over kingly girth—dreams of sugar plums and fairy queens. Are committees composed of such as these? What ghastly fate for any High Adventure and Great Undertaking.

For it is so with committees, as it is with any group of humans: thinking and ability seek a common level, and the common denominator of any group is below the average intelligence of the group. The brilliant is spurned, the thinker is scorned and the mediocre comes into his glory.

Committees do not raise high towers, span the oceans with cable or hammer-out empires. How ridiculous this sounds: Mr. Bell and his committee; Mr. Columbus and his committee; Mr. Carnegie and his committee. No, indeed, Group Thinking has produced very little of permanent value or advanced mankind many steps.

"To be a leader of men one must turn one's back on men."

Havelock Ellis

You might well raise an eyebrow over my concern with committees and say, they are not inconsequential, not all weak clay. And I will agree with you. Committees have their place as fact-finding bodies, as implementing groups, but I do decry their use as creative planning groups, as initiators. I do censure the philosophy which permits committees to sit in judgment on the bold schemes of leaders. I am afraid that all of us are becoming committee-happy and are replacing brilliant individual thinking with low-level group mumbling. Leaders have always been scarce and, as Cicero said many years ago, are becoming scarcer. Then why muzzle those we have with a committee?

Leadership does not mean at the high national level only, but at every plateau of national and industrial life. It happens so often, whenever the guiding head of either a small or large undertaking lacks dynamic leadership qualities he forms a committee, or a planning group and thus hopes (alas, in vain) that the group, because it is many-headed, will supply that creative thinking which is his want. And this a committee can never do because its common denominator is always mediocrity and never inspiration.

I believe in some types of committees, but I believe in the individualist more—in dynamic leadership and venturesome spirit, in the daring of a hero even with all his conceits, idiosyncrasies, his whims and his star gazing.

Because we cannot all be leaders and combat conventions with audacious imaginings, at least let us not squat in committee and with steel bands strap down with petty notions the leaders we have.

Wm. J. Schleicher

Vice President & Editorial Director

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- DRIVE SCREWS — Wood & Type U
- STOVE BOLTS
- HANGER BOLTS
- CARRIAGE BOLTS — Roll Thread

MATERIALS: STEEL, BRASS, ALUMINUM
STAINLESS, SILICON BRONZE
FINISHES: CADMIUM, NICKEL, ZINC, ELECTRO-
GALVANIZED, HOT GALVANIZED
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Write for specific information tailored to your fastener requirements, and details about Southern's new bulk packaging designed to effect new savings in materials handling and storage. Address Southern Screw Company, P. O. Box 1360, Statesville, North Carolina. Phone TRIANGLE 37213; TWX Statesville, N. C. 48.